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Berry Notes

Prepared by the University of Massachusetts Fruit Team

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Massachusetts Berry Notes Underwriters:

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IN THIS ISSUE:

SHORTS:

New England Vegetable & Fruit Conference: The 2017 NEVFC & Trade Show will be held this December 12, 13, & 14, 2017 at the Radisson Hotel in Manchester, NH and will include 32 educational sessions over 3 days, covering major vegetable, berry and tree fruit crops, as well as various special topics, such as hard cider and cut flower production. More at: https://newenglandvfc.org/.

MDAR's Agricultural Business Training Program is partnering with Land for Good on a series of workshops on Farm Succession Planning in December. One of a farmer's biggest challenges is planning for farm succession. A commitment of just three days over the winter months will allow farmers to develop a concrete plan for their farm business, their land, and their retirement. Program includes presentations, group discussions and individual exercises, with "assignments" between sessions. See this flyer for more information.

Massachusetts Farm Succession School:
December 5, 2017; January 11, 2018; February 7, 2018
at the MA Farm Bureau office, 249 Lakeside Avenue, Marlborough, MA
All sessions are 10:00am - 3:30pm

The fee is $300 per farmer or farm couple, which includes lunch, refreshments and materials and $200 of succession-related technical assistance. MDAR's Agricultural Business Training Program will provide additional technical assistance to Massachusetts farmers who complete the Succession School.

Deadline to register is October 20th. Register now - space is limited! - at landforgood.org/events.

MDAR's EXPLORING THE SMALL FARM DREAM course (developed by NESFI) for those exploring or planning a small farm as a commercial enterprise, has a few spots available. This 5-week course will be on **Tuesday evenings from 5:30 – 8:30 PM February 27, 2018 through Tuesday March 27, 2018 in Amherst** (MDAR office, 101 University Drive). Cost is $100 per enterprise. We are accepting applications on first come first serve basis for this course.

For more information or to access an application for either course, go to: www.mass.gov/eea/agencies/agr/land-use/agricultural-business-training-program-abtp.html or contact Melissa Adams at 413-548-1904.

ENVIRONMENTAL DATA

The following data was collected on or about October 4. Total accumulated growing degree days (GDD) represent the heating units above a 50° F baseline temperature collected via our instruments for the 2017 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	GDD			Soil Temp (°F at 4" depth)		Precipitation (in inches)
	2-Week Gain	*2017 Total*	*2016 Total*	*Sun*	*Shade*	*2-Week Gain*
Cape Cod	172	2,470	2,753	62	57	1.74”
Southeast	--	2,145	2,581	66	60	3.13”
North Shore	190	2,543	2,739	57	53	0.58”
East	204	2,771	3,004	64	62	0.77”
Metro West	172	2,455	2,667	58	55	0.12”
Central	196	2,493	--	64	61	0.00”
Pioneer Valley	238	2,623	2,904	58	57	0.14”
Berkshires	212	2,295	2,490	54	53	0.10”
AVERAGE	198	2,475	2,626	60	57	0.82”
n/a = information not available						

(***Source**: UMass Landscape Message #22, October 6, 2017*)

STRAWBERRY

Gray Mold Caused by Several Species of Botrytis

Madeline Dowling and Guido Schnabel, Clemson University

Relationships can be complicated. Isn’t that the theme of nearly every movie, TV show, song, and novel? But the key to every good relationship is understanding. On a business level, a manager should understand his employees to manage them appropriately and maintain good relationships with them. Each person must be handled differently since, like we learned in elementary school, we are all special snowflakes. In the same way, it is important for growers to understand the fungus they are confronted with so they can effectively manage resulting diseases.

Nearly every small fruit grower knows that gray mold is caused by ‘Botrytis’ but few know that there are different versions of Botrytis (species). Several species may cause gray mold on strawberries, grapes, blueberries, and other small fruits. On blueberries and grapes, the species *Botrytis pseudocinerea* is often found in Germany, though it has only been detected in California so far in the United States. Fortunately, understanding this species is easy. It is sensitive to nearly every fungicide except for fenhexamid (Elevate). Apply other fungicides and it is easily managed in the field. Since most growers already do that, this species is not of general concern.

On strawberries, another major species besides *Botrytis cinerea* was found only very recently. It makes up a whopping 30% of the population of Botrytis isolates on strawberry blossoms based on our research that included approximately two hundred fungal isolates from Georgia, South Carolina, North Carolina, Virginia, and Maryland. This species, called *Botrytis fragariae*, is also found in Europe, and has different fungicide resistance tendencies than *B. cinerea*. In fact, *B. fragariae* tends to be more tolerant to fludioxonil (Switch). Fortunately, management of this species may not be very difficult. All *B. fragariae* isolates screened so far are sensitive to FRAC 7 fungicides, including boscalid (Pristine, Endura, Emerald) and the pre-mixtures Luna Sensation, Pristine and Merivon. This means that if resistance to Switch becomes a problem due to the presence of *B. fragariae*, application of any FRAC 7 fungicide will help to remove these isolates from the field.

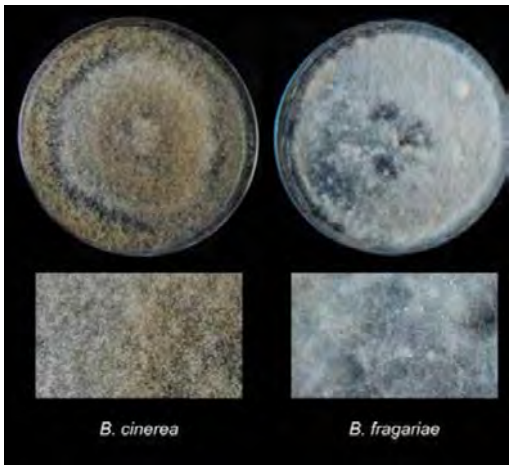

***Figure 1**. Both Botrytis species side by side. White colony (right) shows lack of spores when grown on growth medium.*

Now you have the inside scoop on gray mold of strawberries. Dr. Guido Schnabel and the team at Clemson University are working to better understand these species causing gray mold so that we can continually improve management recommendations. And hopefully now that you are armed with understanding of the species causing gray mold, you will be able to make even better management decisions for the next growing season. (***Source**: The Strawberry Grower, October 2017*)

RASPBERRIES/BLACKBERRIES

Crown Gall and Cane Gall

Kathy Demchack, Penn State Univ. Extension

Crown gall is the more widespread of the two diseases and affects all brambles as well as apples, grapes, peaches, and roses. Only grass-like plants seem to be immune to crown gall. Cane gall occurs only on brambles, with black and purple raspberries being more frequently infected than red raspberries and blackberries. The impact of the disease on plant growth and production can range from no apparent effect to the death of the plant.

Symptoms

Crown and cane gall are characterized by the spongy, rough, pinhead- to golf ball-sized, tumor-like swellings that become brown, woody knots with age. Crown galls develop in the spring on the underground parts--the roots and crown--of the plants. Cane galls develop as whitish eruptions on the fruiting canes in mid-June. These eruptions later turn brown and then black and begin to disintegrate. More intense gall formation seems to occur in years with higher incidence of winter injury. The diseases cause the production of dry, seedy berries and the stunting and prevention of new cane formation. Weakened canes are broken easily by the wind and are more susceptible to winter injury. The plants might show water stress and nutrient deficiency symptoms since the movement of water and nutrients throughout the plant is disrupted. With cane gall, black and purple raspberries are more often infected than red raspberries and blackberries.

Disease Cycle

Both diseases are caused by soilborne bacteria (crown gall: *Agrobacterium tumifaciens* and cane gall: *Agrobacterium rubi*) that infect the plant only through wounds. Wounds can result from natural causes (e.g., insect feeding, frost damage) or from mechanical causes (e.g., pruning, cultivating, harvesting). The bacteria overwinter in the soil and in galls. Bacteria are then spread by splashing rain, running water, cultivation, and pruning from soil and infected plants. As the galls enlarge, the soil can become heavily infested and will remain so for many years.

Disease Management

The best control measure is prevention. Plant only certified, disease-free nursery stock, and take care not to wound the plants, especially the root systems, at planting time. Try to plant only in sites with no history of the diseases, or wait at least 3 to 5 years before replanting in the site. If a diseased plant is detected, remove and burn the roots and tops of the plant. Dispose of the soil surrounding the roots of the affected plant. Titan seems to be especially susceptible to crown gall, as do some of its relatives. No chemical control is known. (***Source**: Penn State Fruit Fact Sheet Series*)

Timely Blueberry Disease Control

Strategies To Control Bacterial Canker In Blueberries Should Start In The Fall

Jay Pscheidt, Oregon State Univ.

Bacterial canker of blueberry shows up in the spring, but to get it under control, growers in areas such as western Oregon and Washington should make applications of copper-based pesticides in the fall. Here's the bottom line: Spray twice, first before fall rains, preferably the first week in October, and again four weeks later. Bacteria resistant to copper products have been detected frequently in the Willamette Valley and British Columbia. Cultural tactics include using resistant cultivars, removing diseased wood, and avoiding late-summer nitrogen applications.

There is very little published information for bacterial canker on blueberry. A report from Oregon (1953) and another from Tasmania (1984) speculate that infection occurs in the fall even though symptoms occur in the early spring. Each is based on sound observations and isolations of the bacteria. Three spray trials done by E.K. Vaughan and C.A. Boller in the 1950s clearly show fall applications of Bordeaux reduce the number of diseased plants in the spring. Fall applications were made in early October and again in early November. Unfortunately they did not test fall versus spring applications. Such a trial still needs to be done.

A water-soaked lesion first appears on canes in January or early February. Then the lesions rapidly expand and turn reddish brown to black. Cankers may extend from a fraction of an inch to the entire length of 1-year-old canes (shoots). Buds in cankered areas are killed. If the stem is not girdled, buds above the canker grow. If girdled, the cane portion above the canker dies. ***Photo credit****: Oregon State University Plant Clinic*

Without much more data on blueberries, we can only draw on similar diseases from other crops. This bacterium incites diseases on many crops. It can cause a "fall disease" (such as shoot dieback of Japanese Maple) or a "spring disease" (such as bacterial blight of lilac). Sometimes the bacteria are active both times of the year such as in cherries.

Bacterial canker of cherry has both fall (canker) and spring (dead bud) symptoms. "Fall" or "spring" indicates when the bacteria are actively invading plant tissue and when control tactics are more likely to be effective. Most of the time, symptoms occur in the very late dormant season or during spring growth for these crops —even if infection occurs in the fall. These diseases are notorious for being erratic in occurrence, devastating when they do occur, and frustrating to manage given the limited tools we have available.

Copper-based products are about the only legal materials one can use against these diseases. Chemical management of these diseases is next to impossible as a sole tactic. Unfortunately we see too much use of copper-based products alone. The notion of using a little more, at higher rates, with more applications to get better timing is the wrong path to go down.

The Problem With Copper

There is published research that clearly shows bacteria resistant to copper-based products in blueberries in the Pacific Northwest. There was a time folks thought that bacteria could not be resistant to copper since it is such a broad-spectrum material hitting many biochemical systems in microorganisms. That changed in the 1990s as evidence mounted against that notion. The more copper is used, the more resistant the bacteria become. Just using higher rates and/or more frequently is not sustainable. The addition of other materials to copper mixes just increases the copper ion concentration and thus has the same effect.

In most cases, people reasoned that using more copper was OK thinking that even if they did not get any disease control, that was not a problem as long as it did not harm the plants. Recent published research on cherries, however, has found that applications of copper-based products made bacterial canker worse. In other words, the non-treated trees had significantly less disease than trees treated with copper-based materials.

Bordeaux was one of the first fungicides ever developed being used to combat a downy mildew problem on grapes in the mid 1800s. So much was used for so long that copper toxicity in soils became a problem. It is my opinion that we should, as an agricultural community, begin to limit the amount of copper that is used so we do not end up with the same problems.

Managing bacterial canker of blueberries will involve the use of one or two applications of copper-based materials in the fall, removal of diseased wood during the winter, and attention to horticultural needs of blueberry such as an acid soil pH. Use of copper-based materials in the spring misses the time of infection and increases the buildup of resistant bacteria.

For specific recommendations visit http://pnwhandbooks.org/plantdisease/blueberry-vaccinium-corymbosum-bacterial-canker.

(***Source**: Peerbolt Small Fruit Update, Oct. 1 2015*)

Blueberry/Huckleberry (Vaccinium spp.) – Witch's Broom Rust

Adapted from Jay Pscheidt, Oregon State University

Cause: *Pucciniastrum goeppertianum* , a rust fungus that alternates between *Vaccinium* spp. (huckleberry, blueberry, and cranberry) and true firs. Infection of blueberry and huckleberry leads to extensive growth in the phloem each year. The telia encircle the swollen stems and produce teliospores that germinate in the spring. Teliospores produce basidiospores, which are dispersed during rain storms. These spores will infect grand, silver, balsam, and subalpine firs. Aecia produced on the fir needles shed aeciospores that infect huckleberry. A uredinial state has not been found. Cool, moist springs favor disease development. Although easily found in natural settings, it is not considered an economic problem. [***Editor's Note**: Reports and direct observations of this disease have increased in New England in recent years*.]

Leaves are OK but stems are overly thickened. Photo by Jay W. Pscheidt, 1993.

Symptoms: Evergreen huckleberry (*Vaccinium ovatum*), highbush blueberry (*V. corymbosum*) and lowbush bluberry (*V. angustifolium*) develop a witches' broom of thickened stems with few or no leaves. Telia form in a reddish brown layer around stems each year. Branches are swollen, spongy, and distinctly yellowish to reddish brown in contrast to the greenish color of normal twigs.

Firs develop white tube-like fruiting structures (aecia) on the lower needle surface. Aecia of can mature on current-year needles in late summer or on previous year's needles in early summer. Aeciospores are generally yellow. Severe infections result in needle drop.

In the center are dark old telia while new telia are forming to either side. They start out white and progressively turn dark red from the bottom up. Jay W. Pscheidt. 2008.

Cultural control

- Remove the alternate host for at least 1000 ft around plantations.
- Removal of the affected branches will have little affect beyond aesthetics.
- 'Rancocas' is considered to have some resistance to this disease.

Chemical control

No chemicals are specifically registered for this disease on huckleberry; however, the following if applied for labeled diseases may be effective.

- Proline 480 SC at 5.7 fl oz/A. Use up to two (2) applications. Do not use within 7 days of harvest. Group 3 fungicide. 12-hr reentry.
- QuiltXcel at 14 to 21 fl oz/A. Do not use more than 82 fl oz/A/season, more than two (2) sequential sprays or within 30 days of harvest. Sprayers should not be used on apples. Group 3 + 11 fungicide. 12-hr reentry.
- Tilt at 6 fl oz/A. Do not use more than 30 fl oz/A/season or within 30 days of harvest. 12-hr reentry.

Reference: Ziller,W.G. 1974. The Tree Rusts of Western Canada. Canadian Forestry Service Publication 1329. (***Source**: Peerbolt Small Fruit Update, Oct. 1 2015*)

SWD and Sour Rot of Grapes

Juliette Carroll, Cornell University

SWD populations are building up and the warm, humid weather of late summer and early fall is very favorable for spotted wing. Any fruit hanging will be at risk of infestation. Not until late November will the majority of female SWD no longer carry eggs, as they prepare for overwintering.

Wayne Wilcox, grape pathologist, Plant Pathology & Plant-Microbe Biology Section, Cornell University, sent this alert out, "…the warm, humid conditions are ideal for the yeast and bacteria that cause sour rot, not just for SWD. These weather conditions strongly favor sour rot, since sour rot appears to require three components: (1) yeast, (2) bacteria, and (3) fruit flies—either the "everyday" fruit fly *Drosophila melanogaster* or SWD *Drosophila suzukii*. SWD is NOT required for sour rot to occur and, indeed, we do not typically find it associated with sour rot in the Finger Lakes region, although sour rot can be common here.

Recent research information on grape sour rot from Wayne's program was summarized last spring on pages 47-57 in GRAPE DISEASE CONTROL, 2016. Included in these pages are details on research trials in field and lab, management tactics, efficacy of fungicides and insecticides, and impact of training systems on the development of sour rot in wine grapes. For those of you growing wine grapes, advising growers on sour rot, or simply interested in a complex and difficult to control disease, these pages are definitely worth a read.

An interesting observation came in yesterday from a wine grape grower in the Finger Lakes where the region has been plagued by drought. Several inches of rain had fallen in their area recently, causing many berries in the cluster to swell and crack. This is an ideal setting for infestation by SWD, other *Drosophila* species, and fruit rot pathogens. (***Source**: Cornell Univeristy SWD Blog post, Sept. 23, 2016*)

Ripe Rot on Grapes

Bruce Bordelon, Purdue University

There are a number of common grape pathogens that can cause fruit rots each year in the region. Black rot and Phomopsis cane and leaf spot are by far the most common fruit pathogens. We also see Botrytis gray mold on some cultivars in cooler regions and years. Another common rot is Sour rot, but it is actually caused by yeasts and bacteria, not filamentous fungi and is spread by fruit flies. It occurs most often when heavy rains near harvest cause berry splitting. I wrote about it in a recent issue.

In the past few years we've had a troubling rot on a new cultivar to the region, Marquette. This early ripening red has excellent wine quality and is one of the new "super cold hardy" cultivars from Minnesota. That makes it a great choice for northern Indiana vineyards. However, Marquette is not without disease problems. While only moderately susceptible to black rot, it is highly susceptible to Phomopsis cane and leaf spot. Extra measures taken to manage Phomopsis have not been successful at stopping all fruit rots on Marquette. So we investigated a bit further to discover that, in fact, a relatively unknown disease to our region causes a late-season fruit rot. Ripe rot is caused by *Colletotrichum gloeosporioides* and is common in the warm southern Atlantic wine growing regions, but not cooler regions of the Midwest. It may be that the disease is spreading more westward, or more likely, that Marquette is just particularly susceptible. Marquette ripens about 2 weeks earlier than most cultivars so it's possible that higher temperatures during ripening are partially to blame.

One concern with ripe rot is that it can infect fruit during the ripening period. The other fruit rots we commonly deal with infect much earlier in the season, so growers quit applying fungicides after mid-summer as risk for infection is greatly diminished. The lack of late-season fungicide applications may be why we are seeing ripe rot show up on susceptible cultivars. We will have to change our recommendations to reflect this new threat. Captan, Ziram and strobilurin fungicides have good activity against ripe rot.

The primary symptom of ripe rot is rotting of ripe fruit. Symptoms are not common on leaves, shoots, or cluster stems (unlike Phomopsis that also causes a rot of ripe fruit). Affected berries develop circular, reddish brown spots on their skins and the spots subsequently enlarge to include entire berries. A key characteristic is that infected berries become covered with salmon-colored spore masses of conidia as they decay. Eventually diseased berries shrivel and resemble the terminal stages of several other rot diseases (black rot, Phomopsis). Presence of the characteristic salmon-colored conidia from acervuli is diagnostic for ripe rot.

Figure 1. Healthy clusters of Marquette (left), early stages of ripe rot (center), late stages of ripe rot (right). Photo: B. Bordelon, Purdue Univ.

(***Source**: Facts for Fancy Fruit, Vol. 17, No. 12, Oct. 3, 2017*)

GENERAL INFO

Fall Soil Testing

Katie Campbell-Nelson and Lisa McKeag, UMass Extension

Although soil samples can be taken any time, many prefer to take samples in the fall because this allows time to apply any needed lime to adjust pH, plant a cover crop to recover any leftover nutrients, make a nutrient management plan, and order materials well in advance of spring planting. It is best to take soil samples at the same time of year for the most consistent and reliable results. Avoid sampling when the soil is very wet or soon after a lime or fertilizer application. If a field is uniform, a single composite sample is sufficient. A composite sample consists of 10 to 20 sub-samples taken from around the field and mixed together. To obtain sub-samples, use a spade to take thin slices of soil representing the top 6" to 8" of soil. Make sure to remove any thatch or other organic debris such as manure from the surface before taking your sample as this will inaccurately impact your soil organic matter results. A soil probe is faster and more convenient to use than a spade. Put the slices or cores into a clean container and thoroughly mix. Take about one cup of the mixture, dry it at room temperature spread out on paper, put it in your own zip lock bag, and tightly seal it. Label each sample on the outside of the bag or box. On the submission form to the lab for each sample, indicate the crop to be grown, recent field history and any concerns.

In many cases, fields are not uniform. There are many reasons for this including: uneven topography, wet and dry areas, different soil types and areas with varying previous crop and fertilizing practices. For example: "There was a tractor mishap in this field years ago and a ton of lime was dumped right here." In such cases, the field should be subdivided and composite samples tested for each section or avoid problem areas entirely.

Soils should be tested for organic matter content every two or three years. Be sure to request this as it is not part of the standard test. A standard soil test at the UMass Soil Lab costs $15; with organic matter it costs $21.

Submitting soil samples:
Depending on your goals, different tests are appropriate. In addition to standard soil tests, other services are available including: Pre-Sidedress Soil Nitrate Test (PSNT), manure or compost analysis (from the University of Maine), soilless greenhouse media, soil texture, and plant tissue analysis. (Click on each link to access the submission form).

A fall nitrate test or "report card nitrate test" as some university labs call it, indicates how closely crop nitrogen (N) uptake has been matched with nitrogen supply for the season. High (> 20 ppm) or excessive soil nitrate content in the fall indicates that too much N fertilizer was applied in the prior season, and a fall cover crop would be beneficial to conserve this remaining N for the following season. Use the Pre-Sidedress Soil Nitrate Test form to submit a Nitrate test soil sample, or check the box for Nitrate on the standard soil test submission form; it is only an additional $6.

A standard soil test that includes other macro- and micronutrients can help you make the best choice to fit a particular crop to a given soil nutrient profile for the following season. When submitting your soil sample for testing, include the crop code on the form for the crop to be grown in that field the following year. Haven't prepared your crop rotation plans yet? No worries. You may ask for recommendations for up to 3 different crops without extra charge. Use this form for Vegetable and Fruit Crop Soil Submissions.

Interpreting Results and choosing amendments.
For specific information on interpreting your UMass Soil Test results, see this factsheet that accompanies each soil test report.

Soil pH: Most New England soils are naturally acidic (4.5-5.5) and need to be limed periodically to keep the pH in the range of 6.0 to 7.0 desired by most vegetable crops and beneficial microbes. The lab report will recommend the amount of lime to apply based on active and exchangeable acidity as well as the crop(s) to be grown. Active acidity is a measure of the H+ ions in solution while exchangeable acidity is a measure of H+ ions adsorbed on soil humus and clay colloids.

Soils with a higher cation exchange capacity (CEC) have a greater potential for higher exchangeable acidity. Therefore, more lime will be needed to raise the pH in a high CEC organic matter soil than in a low CEC sandy soil with the same amount of active acidity. Lime can be applied any time, but fall is preferred to allow several months to raise the pH. Split applications (half in the fall and half in the spring) may also be effective.

Compost is often applied as a method for increasing soil organic matter. However, do not overlook the fact that composts contain nutrients which are soluble and available for crop use just like commercial fertilizers. While only about 10% of total N analysis in compost is available to the crop each year, 80-100% of P analysis in compost has been shown to be available, increasing the potential for losses to the environment if not applied to actively growing crops. Phosphorous content also varies in compost from 0.1-3%, so analysis is important for determining rates of application. Sheet composting is not a recommended practice on bare fields in the fall unless a cover crop is planted. A compost analysis should be completed to measure nutrient availability and to determine if the product is finished before applying to the field. Unfinished compost applied to the field may harbor pathogens or harm crops as it continues to decompose. Ammonium content <100mg/kg and C:N ratio of 20:1 indicates a finished compost. Higher amounts of ammonia indicate active decomposition, or unfinished compost, and the C:N ratio is reduced as microbes break down carbon content in the pile and convert it to CO2. Matured compost applications are usually made in the spring, however, testing may happen in the fall in order to estimate plant available nutrients for next year's crop and help determine future compost application rates.

Manure is an excellent source of nutrients, however, as manure ages and decays, considerable nutrient loss occurs from leaching, surface runoff, or volatilization of ammonia into the atmosphere. Manure may also contain pathogens such as E. coli and salmonella. If manure is used, vegetables should not be harvested before 120 days after application (or 90 days for vegetables that do not contact the soil, such as peppers). This is a requirement for organic production and a good practice for everyone. In most cases, manure should be applied in the fall or to a non-food rotation crop. Fall-applied manure should be incorporated immediately and a winter cover crop should be planted to protect N from leaching. Manure applications should be made in cold weather to reduce volatilization, but not to frozen ground as this increases surface runoff potential. In no-till systems, research has shown that manure can be effectively surface applied to a growing cover crop to reduce nutrient losses, but not to bare ground. In order to make accurate nutrient applications to best fit your crop needs, a manure analysis should be conducted. The University of Maine has a manure testing lab; here is their Manure Sample Submission Form. Be sure to submit your samples in a tightly sealed container or the postal service will be very unhappy with you!

Cover crops planted in the fall, preferably before September 15th, are an excellent way to capture and store nutrients for your crops in the following spring. While your soil test results will not recommend cover crop selection, here are some general guidelines for fall-planted cover crops and their spring contributions of plant available nitrogen (PAN) per acre:

Legume cover crops provide up to 100 lb PAN/a. To maximize PAN contribution from legumes, kill the cover crop at bud stage in the spring.

Cereal cover crops immobilize up to 50 lb PAN/a. To minimize PAN immobilization from cereals, kill the cover crop during the early stem elongation (jointing) growth stage.

Legume/cereal cover crop mixtures provide a wide range of PAN contributions, depending on legume content. When cover crop dry matter is 75 percent from cereals + 25 percent from legumes, PAN is usually near zero.

Micronutrient application recommendations cannot be determined accurately by soil labs in New England because deficiencies in crops have not been widely measured in our soils. However, the soil test results do report the ranges found in all the soils that come through the lab so that you may compare where your soil falls in regards to other soils in New England. For recommendations on specific micronutrients needed for crop growth, such as Boron, see the New England Vegetable Management Guide section on micronutients. Preferred timing of micronutrient applications in the fall vs. spring has not been determined.

Other Nutrient applications should be avoided until spring when a growing crop is best able to use the applied nutrients in water soluble form and avoid leaching, runoff, or volatilization.

Need further assistance interpreting your soil test results? Contact the soil lab or any of the following Extension Educators:

Vegetables:
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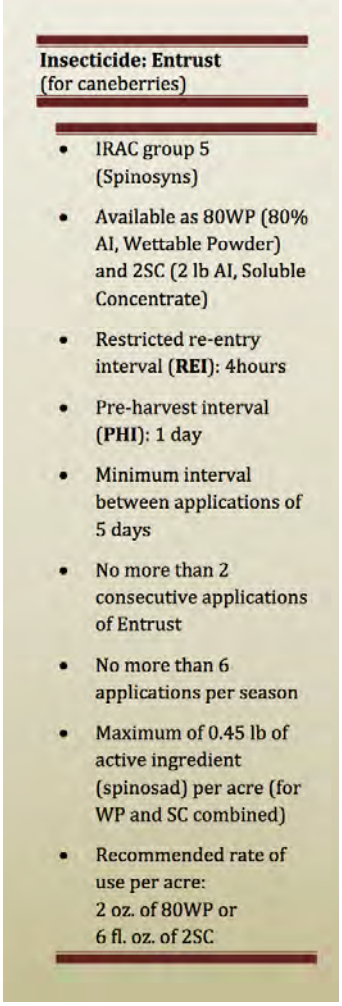
(***Source***: *UMass Vegetable Notes, Vol. 29:22*)

Organic Insecticides for Spotted Wing Drosophila Control: Entrust and Grandevo

Janet van Zoeren and Christelle Guédot, University of Wisconsin



Entrust and Grandevo are two OMRI (Organic Materials Review Institute) certified insecticides, which are available for use against spotted wing drosophila in organic raspberry production in Wisconsin. As there are only few organically approved insecticides with efficacy against spotted wing drosophila, it is extremely important for organic growers to be cognizant of rotating insecticide modes-of-action to avoid insecticide resistance among spotted wing drosophila. Along with Entrust and Grandevo, which are covered in more detail below, another option available for an organic rotation is Pyganic (Insecticide Resistance Action Committee (IRAC) group 3A, pyrethoids). For additional information specific to organic raspberry control of spotted wing drosophila, you can read the Michigan State University extension publication "Integrated Strategies for Management of Spotted Wing Drosophila in Organic Small Fruit Production", available online at: http://www.ipm.msu.edu/uploads/files/SWD/MSU_Organic_SWD_factsheet.pdf.

Entrust is registered for use in Wisconsin on caneberry crops, including raspberries, blackberries, and loganberries. It is marketed by Dow AgroSciences® under the formulations 80WP (80% active ingredient as a Wettable Powder) and 2SC (2 lb of active ingredient per gallon as a Soluble Concentrate). Entrust is a naturalyte insect control product that is OMRI approved and contains the active ingredient Spinosad. Spinosad is biologically derived from the fermentation of *Saccharopolyspora spinosa*, a naturally occurring soil bacteria. Entrust is in the class of the Spinosyns (IRAC code 5). Its mode of action is primarily on the nicotinic acetylcholine receptors, causing excitation of the insect nervous system which leads to muscle contractions, paralysis, and eventually death. Entrust is most effective through ingestion of treated plants but also has highly effective contact activity.

As well as caneberries, entrust is registered for use on strawberries and bushberries (including blueberry, currant, gooseberry, and elderberry). Along with providing control of spotted wing drosophila, Entrust is effective against Lepidopera pests, such as fruitworms, leafrollers, and armyworms, and sawflies. Refer to the label for specific rates and regulation for other berry crops and pests other than spotted wing drosophila.

Entrust may be applied by ground equipment, chemigation, and by air. See the label for specific application recommendation and regulations for each method.

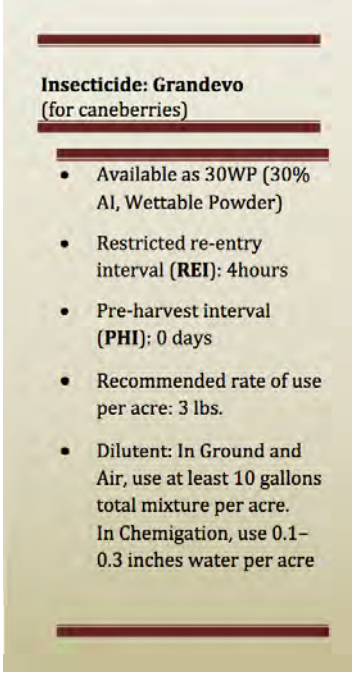
Entrust is toxic to bees exposed to treatments for three hours following treatment. As a precaution, avoid applying any pesticide during bloom when bees are flying. Entrust is toxic to aquatic invertebrates and must not be applied directly to water.

As always, make sure to read the label before using any pesticide. You can find the labels of Entrust at the following link for Entrust 80WP www.cdms.net/ldat/ld62B024.pdf and for Entrust 2SC https://assets.greenbook.net/15-38-19-20-07-2017-D02-

399-007_Entrust_SC_Specimen_Label.pdf.

Grandevo from Marrone© Bio Innovations is a biological insecticide/miticide containing the active ingredient *Chromobacterium subtsugae* strain PRAA4-1^{T}.

Chromobacterium subtsugae is a bacterium commonly known as Achromacil™ that functions primarily as a stomach poison. It works by creating complex modes of action and control is achieved by unique combinations of repellency, oral toxicity, reduced egg hatch, and reduced fecundity. It is OMRI approved.



Grandevo is registered for use on caneberries (including raspberry, blackberry, and loganberry), as well as strawberries and bushberries (including blueberry, currant, gooseberry, and elderberry). Along with providing control of spotted wing drosophila, Grandevo has shown effectiveness against leafrollers, fruitworms, armyworms, aphids, and thrips. Refer to the label for specific rates and regulation for other berry crops and pests other than spotted wing drosophila.

Grandevo may be applied by ground equipment, chemigation, and by air. See the label for specific application recommendation and regulations for each method. When mixing with water, do not mix more than 24 hours before use, and add ¾ of the desired quantity of water before adding the Grandevo.

Thorough coverage of infested plant parts is necessary for effective control of spotted wing drosophila, as well as of other insects and mites.

Note that this product is not toxic to bees but repels them for up to 4-6 days after spraying. It is toxic to certain non-target arthropods and aquatic invertebrates, and should not be applied directly to water.

As always, make sure to read the label before using any pesticide. You can find the label of Grandevo at the following link https://marronebioinnovations.com/wp-content/uploads/delightful-downloads/2017/03/GRANDEVO_SpecimenLabel_NoBioLogo_2013_03_web.pdf, and specific information for use of Grandevo against spotted wing drosophila in caneberries at https://marronebioinnovations.com/wp-content/uploads/delightful-downloads/2016/12/GRANDEVO-2ee-Recommendation-to-Suppress-Spotted-Wing-Drosophila-in-Caneberries.pdf.

(***Source**: Wisconsin Fruit News, Vol. 2, Issue 12 – Sept. 15, 2017*)

UPCOMING MEETINGS:

October 10, 2017 – *Integrated Cover Crop Field Meeting*, 3:00-5:00. UNH Cooperative Extension. Moulton Farm, 18 Quarrey Rd., Meredith NH. For more information go to: https://extension.unh.edu/events/files/D1D7CD6D-5056-A432-4FF0965631A1E2D9.pdf.

October 12, 2017 – *Cover Cropping at River Berry Farm*, 3:00 – 5:00. University of Vermont Extension. River Berry Farm, 191 Goose Pond Rd, Fairfax VT. For more information go to: https://www.eventbrite.com/e/cover-cropping-management-on-a-vegetable-farm-tickets-37970548934.

October 30, 2017 – *North Country Fruit & Vegetable Seminar & Trade Show*. 9am 0 3pm. UNH Cooperative Extension. Mountain View Grand Resort, Mountain View Rd., Whitesfield NY $20 For more information go to: https://extension.unh.edu/events/files/ACF3977F-5056-A432-4F2AB32FE8F1F632.pdf.

November 1-3, 2017 – *Southeast Strawberry Expo*. Hilton Wilmington Riverside, Wilmington North Carolina. For more information or to register, go to: https://ncstrawberry.com/events/2017-southeast-strawberry-expo.

November 4-6, 2017 – *MOFGA Farmer to Farmer Conference*. Point Lookout, Northport, ME. For more information and to register, go to: http://www.mofga.org/Events/FarmertoFarmerConference/tabid/293/Default.aspx.

December 5-7, 2017 – *Great Lakes Expo*. Devos Place Conference Center and The Amway Grand Plaza Hotel, Grand Rapids, MI. Registration opens September 25, 2017. Go to http://glexpo.com for more details on program and registration.

December 12-14, 2017 – *New England Vegetable & Fruit Conference*. See the website for program and registration information as it becomes available. Go to https://newenglandvfc.org.

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