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Berry Notes

Prepared by the University of Massachusetts Fruit Team

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UPCOMING MEETINGS

NRCS Enhances Web Soil Survey in New Version - The latest version of the [Web Soil Survey](#) was recently launched by USDA's Natural Resources Conservation Service (NRCS). The application provides free soils information along with soil maps, properties, and interpretations aimed at helping with land use decisions. The new version includes improved map appearance, increased Area of Interest acreage, and upgraded options for changing map properties. Web Soil Survey is now online 24 hours a day.

Food Safety Modernization Act, FSMA - The FDA is accepting comments on its proposed regulations of the [Food Safety Modernization Act](#) (FSMA) until November 15th. The proposed rules for growing produce ("the Produce Rule") and processing ("the Preventive Controls Rule") are being challenged by many, as they could place an unfair and heavy burden on family farms and businesses if implemented. If you're a farmer, a processor, or want to remain an informed consumer, please [learn about the issues](#) and consider submitting a comment to FDA by the November 15th deadline..

In addition to listening to the information session recording, you can read up on the proposed rules and learn how to comment by following these links to some great resources:

[MA Farm Bureau Federation's FSMA comments, info, and suggestions](#)
[FSMA Q&A on the Proposed Produce Rule \(Rutgers\)](#)
[FSMA Proposed Preventive Control Rules Info \(FDA\)](#)

New England Vegetable & Fruit Conference – 2013: Mark your calendars or go now to www.newenglandvfc.org to check out the program and register. Hotel reservations should be made early as the rooms often sell out.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately two week period, September 19 through October 2. Soil temperature and phenological indicators were observed on or about October 2. Total accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments for the 2013 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	2012 Growing Degree Days		Soil Temp (°F at 4" depth)	Precipitation (1-week gain)
	2-week gain	Total accumulation for 2013		
Cape Cod	136	2,723	68°	0.20"
Southeast	107	2,443	66°	0.32"
East	118	2,724	65°	0.34"
Metro West	58	2,386	62°	0.50"
Central	n/a	n/a	n/a	n/a
Pioneer Valley	117	2,658	63°	0.77"
Berkshires	74	2,257	57°	0.90"
Average	100	2,521	64°	0.51"

(Source: UMass Landscape Message #22, Oct. 4, 2013)

STRAWBERRY

Year One of a Test of Biological Fungicides in Strawberries

Mark Bolda, Monise Sheehan, Univ. Calif. Ag. and Nat. Resources

This is simply a summary of one year of biological fungicide work in strawberries in 2012-2013 and should not be understood as a recommendation to use any of these products. This investigation will continue into 2013-2014 and will serve to confirm and adjust the work here.

Introduction: A number of biological fungicides registered for use in strawberries have not been thoroughly tested through empirical studies to give guidance to growers on their efficacy and use.

Materials and Methods:

Table 1 below is an outline of materials tested in 2012-2013.

Table 1. List of treatments.

Test Material	Application/ Use
Dazitol	6.25 gal/A applied 3-5 days prior to planting
Biotam + Serenade Soil	5 lbs/A pre-plant application 3-5 days prior to planting followed by Serenade Soil @ 4 qt/A (10 days after planting, and then Serenade Soil @ 2 qt /A applied monthly after planting. Second application of Biotam 5 lbs/A and Serenade Soil @ 4 qt/A in February.
Serenade Soil	Serenade Soil @ 4 qt/A (10 days after planting, and then Serenade Soil @ 2 qt /A applied monthly after planting.
Serenade Soil	Serenade Soil @ 4 qt/A (10 days after planting, and then Serenade Soil @ 4 qt /A applied every 60 days after planting.
Actinovate Rate 1	(1) 3 oz per 100 gal root dip at planting.

	(2) followed by 6 oz/A pre-plant in drip tape (3) followed by 3 oz/A every 30 days in drip tape
Actinovate Rate 2	(1) 3 oz per 100 gal root dip at planting. (2) followed by 6 oz/A pre-plant in drip tape (3) followed by 6 oz/A every 30 days in drip tape
SoilGuard	Apply at planting as root dip or planting furrow drench at 5 lb/ A and again through drip tape every 4-6 weeks through harvest.
Double Nickel 55	Apply at planting at 1 qt /A (1/2 lb/A powder) as root dip or planting furrow drench and again through drip tape every 4-6 weeks through harvest.
Terra Clean 5.0	(1) 128 fl oz/100 gal drench (2) 2 gal/A drip applied at planting (3) 1 gal/A drip applied 10 days post plant and 28 days post plant (4) 1 gal/A drip applied 60, 90 and 120 days post plant
Terra Clean 5.0 + Serenade Soil	(1) 128 fl oz Terra Clean /100 gal drench + Serenade Soil @ 6 qt/ A soil drench (2) 2 gal/A Terra Clean drip applied at planting followed by SS @ 3 qt /A (3) 1 gal/A Terra Clean + 3 qt /A Serenade Soil drip applied 10 days post plant and 28 days post plant (4) 1 gal/A Terra Clean + Serenade Soil @ 3 qt/ A drip applied 60, 90 and 120 days post plant
Tainio	(1) Spectrum @ 50 g / A + Pepzyme C @ 12.5 oz/A 2- 3 days preplant (2) Biogenesis @ 1 lb/A+ Pepzyme C @ 12.5 oz/A as plant dip (3) Pepzyme C monthly through drip tape (4) Micro 5000 @ 2.66 oz/A at 2 leaf stage foliar

Plant dips were made by suspending the requested rate of fungicide in approximately twenty gallons of water and submerging and soaking about a half a box of strawberry transplants (about 500 plants) thoroughly and then distributing to planting crews for transplant. Note that in the case of the two Actinovate treatments, plants were held for one night to prior to transplant, ostensibly to establish the organism on the plant roots.

Drip applications were made with a portable pump injecting each fungicide. Each application normally was preceded by filling the drip tape with clear water, injecting the mix and then further pumping in clear water to make sure the fungicide had moved well out of the drip tape.

Application dates:

Preplant application – 11/3/2012

- Dazitol
- Terra Clean 5.0
- Terraclean 5.0 + Serenade Soil
- Tainio Spectrum + Pepzyme C
- Biotam

Root dip + one overnight hold – 11/7/2012 (planted November 8)

- Actinovate rate 1

- Actinovate rate 2

Root dip and immediate planting – 11/8/2012

- Double Nickel 55
- Soilguard
- Biogenesis + Pepzyme Z

10 days post – plant – 11/20/2012

- Serenade 4 qt
- Serenade 2 qt

Monthly applications (12/11/2012, 1/16/2013, 2/26/2013, 3/27/2013, 4/30/2013, and 6/13/2013)

- Terra Clean 5.0
- Terraclean 5.0 + Serenade Soil
- Tainio Spectrum + Pepzyme C
- Serenade 4 qt
- Serendade 2 qt
- Actinovate rate 1
- Actinovate rate 2
- Double Nickel 55
- Biotam applied 2/26/2013; Serenade 4 qt per acre applied other dates in treatment
- Soilguard

Several dying plants from different areas of the test plots were sampled in July to confirm that Verticillium was the cause of plant death.

As a gauge of plant vigor from each treatment, strawberry plant diameters were measured February 13, and April

Results:

13. Measurements were in centimeters and from twenty plants in each plot.

With the beginning of fruit ripening, fruit harvest was done weekly in each treatment replicate. On each pick date, fruit from each plot was weighed and counted.

	Plant D cm 2/13/2013	Plant D cm 4/13/2013	Yield to 5/14/2013	April Total Yield g/plot
Actinovate r1	14.05a	16.25a	3894.00a	2175.00ab
Actinovate r2	13.70ab	16.42a	3818.33a	2428.00a
Biotam	11.47b	15.77a	2176.67b	1377.00b
Dazitol	11.70b	17.70a	2505.67ab	1568.00ab
Double Nickel 55	12.65ab	15.92a	3084.00ab	1637.00ab
Serenade 4 qt +2 qt	11.57b	16.65a	2853.00ab	1471.67b
Serenade 4 qt +4 qt	12.42ab	16.02a	2621.00ab	1459.67b
Soilguard	11.85b	16.78a	2993.33ab	1652.33ab
Tainio	12.93ab	16.95a	3454.00ab	2075.33ab
Terraclean	11.50b	16.78a	2284.00b	1406.67b
Terraclean + Serenade	12.47ab	17.11a	2656.33ab	1559.67ab
Untreated grower standard	11.70b	17.90a	2145.00b	1189.00b

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

	May Total Yield g/plot	June Total Yield g/plot	July Total Yield g/plot	Aug Total Yield g/plot	Total Yield g/plot
Actinovate r1	3741.67a	2791.00a	1902.33a	140.64a	16820.67a
Actinovate r2	3069.67a	3237.67a	2812.33a	149.35a	17201.34a
Biotam	2254.00a	3251.33a	3402.00a	503.14a	14468.33a
Dazitol	2514.67a	3075.33a	3049.33a	269.16a	14625.00a
Double Nickel 55	3038.67a	2837.67a	2573.67a	203.64a	15052.67a
Serenade 4 qt +2 qt	3244.67a	3287.00a	3623.67a	371.49a	16887.67a
Serenade 4 qt +4 qt	2959.67a	3617.67a	3236.33a	362.02a	16157.00a
Soilguard	3212.33a	3331.67a	2887.00a	359.45a	16352.33a
Tainio	3409.00a	3687.33a	3190.33a	170.27a	18145.00a
Terraclean	2496.67a	2997.00a	2750.00a	125.01a	13681.33a
Terraclean + Serenade	2544.00a	2810.00a	2230.00a	191.78a	13454.33a
Untreated grower standard	2812.00a	4019.33a	3800.00a	306.15a	16150.33a

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

Plant diameters measured on February 13, 2013, were significantly larger in the low rate of Actinovate than the other treatments with the exception of the high rate of Actinovate, Tainio and Double Nickel 55.

Both rates of Actinovate realized higher fruit yield than all other treatments except for the Dazitol, in cumulative fruit yield, which included six weekly harvests, up to May 14, 2013. No further differences were realized between May and August.

As noted above, this field has a very high infestation of Verticillium and all plots began to experience pronounced plant dieback in June, with some 60-80% remaining alive or declining and by end of July, nearly all plants in all

replicate plots had died. There was a trend for plants which had produced larger amounts of fruit in April and May to experience lesser fruit production lesser vigor and earlier dieback as the season progressed.

Conclusion

The results of this trial are encouraging. In the early part of the season up through the middle of May, several treatments had significantly higher amounts of fruits harvested than the grower standard. Nonetheless, none of the treatments provided sufficient protection to the plants to prevent an almost complete die out of the plants by August, effectively ending the season. (Source: UCANR Berry Blog. Oct. 9, 2013)

Disease Snapshot: Strawberry Red Stele Root Rot

Zachary Frederick, Graduate Student and R. Kerik D. Cox, Assistant Professor, Cornell University

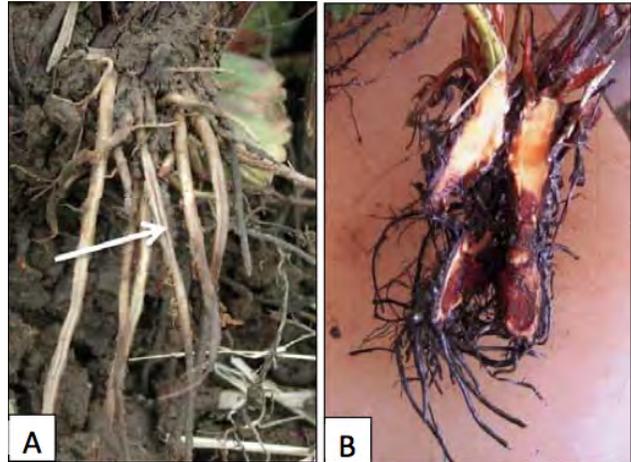
Causes: *Phytophthora fragariae*

When to watch for it: All season

First line of defense: Use disease free planting stock and clean tools and equipment to prevent the spread of soil inoculum.

Summary: Red stele root rot is a particularly severe problem in production areas where strawberries are cultured as a perennial crop in cool, wet conditions. The severity of the above ground symptoms usually depends on the degree of root rot, which implies that minor infections have few or no aboveground symptoms. Severe infections will appear as wilts in wet depressions of a field during hot weather, and may produce little or no fruit and runners. Older leaves of severely infected plants will become tinged red, orange, or yellow. Lateral roots are the first to rot away after infection, and are followed by main roots, which rot from tip to crown. The stele turns red once it is infected, and the crown will follow as infection progresses. As the infections age, the stele of the root and the inner tissues of the crown will turn brown and aboveground portions of the plant will wilt.

Preventing the introduction of *P. fragariae* into the planting site by planting certified stock and not selecting a site that will not receive runoff from infested sites is



Above: A. Strawberry roots showing characteristic reddening of the stele when cut open (at arrow). Note the blackening of root tips below the sites that were cut, and the overall lack of lateral roots one would observe on a healthy plant. This gives the infected plants a “rattail” like appearance. B. As infections progress, the crown of the plant will also discolor and rot away.

essential to preventing disease. Once established, resting oospores and persist in soils. This limits management options to improving site drainage, selection of resistant cultivars, and the use of phosphorous acid, fosetyl-AL, and mefenoxam products to reduce the incidence of red stele. Soil fumigants have not been shown to completely eradicate *P. fragariae* from infested soils. (Source: New York Berry News, Vol. 11, No. 9, Sept/Oct 2012)

Entomopathogenic fungus, *Beauveria bassiana* promotes strawberry plant growth and health

Surendra Dara, Univ. of Calif Ag and Natural Resources

Fungi such as *Beauveria bassiana*, *Isaria fumosorosea*, *Metarhizium brunneum* are pathogenic to mites and insects and are primarily used for pest management. Some of these are known to endophytically colonize plants and offer protection against arthropod pests feeding on those plants. Some studies have indicated that entomopathogenic fungi can also provide protection against plant pathogens.

In an effort to explore the endophytic potential of entomopathogenic fungi for strawberry pest management, studies were conducted in 2010



Strawberry plants were grown in 20X5X2' wooden beds. (Photo by Adrienne Ferree)

using commercial and California isolates of *B. bassiana* and *M. brunneum* where

B. bassiana successfully colonized strawberry plants and persisted for up to 9 weeks in various plant tissues. Observations during this study suggested that endophytic entomopathogenic fungi could be aiding in plant health probably through mycorrhizal activity by improving water and nutrient absorption. Based on these observations, a small study was conducted to evaluate the impact of *B. bassiana* on strawberry plant health in comparison with a

commercial product intended to promote plant growth, health, and yield.

This study was conducted in collaboration with Los Angeles County Pitchess Detention Center where inmates assisted in taking care of the plants and collecting data. Since this was the first project in such collaboration, a simple experiment was designed for easy execution and data collection.

Treatments included i) Untreated control, ii) HYTA – which contains soil-based microorganisms that enhance nitrogen absorption, solubilize nutrients, and build soil organic matter, and iii) *B. bassiana* (Mycotrol –O). Transplants of the strawberry variety Monterey were treated by applying HYTA or *B. bassiana* to the root system in transplant trays. Planting was done 48 hours after treatment in 20X5X2’ raised beds. Plants were regularly watered and fertilized with fish emulsion. Plant health was monitored for about three months starting from 4 weeks after planting. Plants were periodically observed and their health was rated on a scale of 0-5 where 0=dead, 1=weak, 2 and 3=moderate, 4=good, and 5=very good.

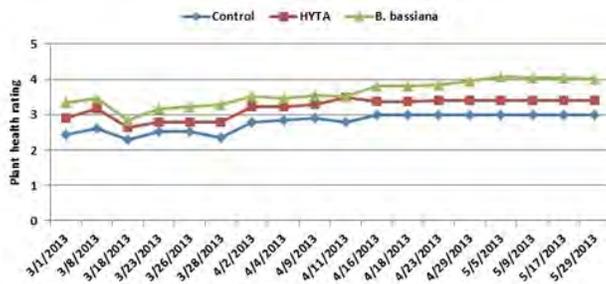
Except for a few aphids on some plants, the trial did not have any pest infestations. Plants treated with *B. bassiana* were rated higher than untreated control or those treated with HYTA throughout the observation period although differences were not statistically significant on all observations dates. While the plant health rating ranged from 2.3 to 3.0 for untreated control, it was between 2.6 and 3.5 for those treated with HYTA and 2.9 to 4.1 for those treated with *B. bassiana*. The average seasonal health rating was 2.8, 3.2, and 3.6 for untreated, HYTA, and *B. bassiana*, respectively. Fruit yield could not be monitored due to some technical difficulties.

Beneficial microorganisms establish symbiotic relationship with plants and serve as extended root system improving the absorption of nutrients and moisture. By colonizing the roots and other plant tissues, they can also provide protection against plant pathogens. Several commercial formulations of fungus and bacteria based

beneficial organisms are currently available for use on various crops. This preliminary study demonstrates that *B. bassiana* promotes plant health and can play an important role in crop production in addition to the primary role of pest management. Additional studies can

further explore the potential of entomopathogenic fungi in promoting plant growth and improving yield as well as providing protection against pests and diseases.

Acknowledgements: Thanks to Mike Fahner, Cedar Point Nursery for providing transplants and Joe Coelho, DB Specialty Farms for providing drip tapes and plastic mulch.



Strawberry plant health from treating with HYTA and *B. bassiana* compared to untreated control

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(Source: UCANR Berry Blog. Sept. 30, 2013)

RASPBERRIES/BLACKBERRIES

Pest Profile: Raspberry Crown Borer

Adapted from Pam Fisher and Maryam Sultan, Ontario Ministry of Ag. And Food Resources

The raspberry crown borer is a clearwing moth, similar in appearance to a yellow jacket wasp. It measures approximately 25mm in length and has a wingspan of about 30mm. The adult can be seen basking on raspberry foliage during the day (Figure 1).



Fig 1: Raspberry crown borer adult on raspberry leaf measuring about 25mm in length

Crown borer larvae are white with a light brown head. They possess three pairs of very small true legs and four pairs of prolegs (Figure 2). They range in size from a few mm to 30mm when fully grown. They are found in the raspberry crown where they feed and tunnel into crown tissue. As they feed, they deposit reddish brown, granular frass behind them. Their burrowing severely damages the crown and eventually affects above-ground tissue. The canes become weak and spindly and fruiting canes often collapse while the fruit is still immature. Foliage may wilt and die on affected canes. Eventually, primocanes become so few in number that the planting dies out.

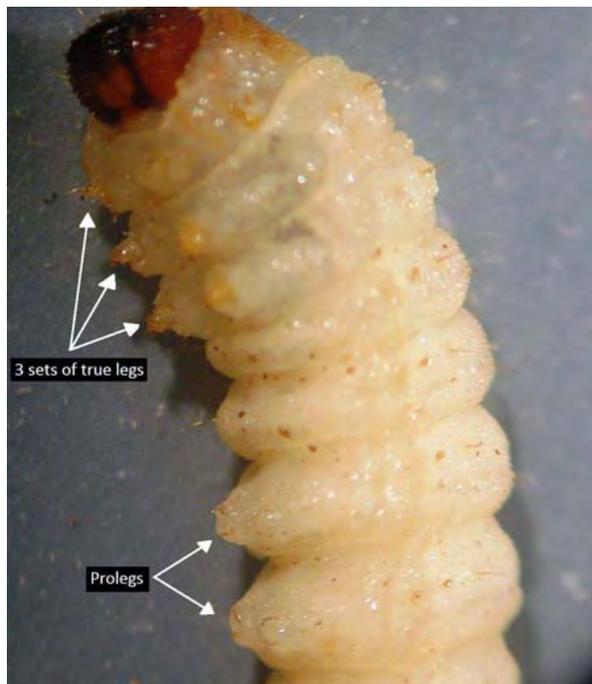


Fig 2. Raspberry crown borer larva from the side showing its 3 sets of true legs close to the light brown head. Only 2 or 4 pairs of prolegs are shown.

Damage from this pest can often go unnoticed for some time. Symptoms are sometimes confused with winter injury, or Phytophthora root rot. To diagnose the problem accurately, use a spade to dig up crowns of weak plants. Shake away the soil and examine the crown for reddish-brown frass and tunnels. Use hand-pruners to cut the crowns carefully to look for crown borer larvae in and around the damaged area (Figure 3). In late fall and early spring, tug on affected canes. If crown borer is the culprit, the affected cane will usually break off at the base, revealing larvae and frass below.



Fig 3. Raspberry crown borer larvae tunnelling into crown tissue. The arrow points at frass associated with larval feeding.

Biology

The raspberry crown borer has a two-year life cycle. In late July, August and September females lay single, reddish-brown eggs on the underside of young leaves. The adult is active for about one week. Females can lay around 140 eggs in this time.

The larvae emerge about one to two months after egg-laying and migrate down to the base of the cane. Each larva overwinters in a hibernaculum below the soil surface. In the spring, they begin boring tunnels and cavities into the crown tissue. The larvae also feed on and girdle roots and other canes belonging to the same crown. They spend their second winter within the roots of the plant. During July of the second summer, pupation occurs inside the crown and mature adult crown borers emerge between late July and September.

Management and Control

Researchers are working on the development of a pheromone lure to attract adult insects but these are not yet available.

Field sanitation, clean pruning and habitat management will help to reduce pressure from this pest. Remove nearby wild brambles to reduce the likelihood of infestations. Prune out and destroy old canes each spring, cutting them as close to the ground as possible, to destroy larvae overwintering at the base of the cane. Keep grass mowed short and weeds under control to reduce the shelter they provide to adults during the egg-laying period.

[Editor's Note: Insecticides available for use in New England include: **Altacor:** This product was registered in August 2010 through the minor use registration program and will require more careful timing for control. It is effective on early instar larvae, which must ingest the product to be affected. The product must be present on foliage and eggs, to control hatching larvae in mid-late summer. We need more field experience with this product in order to develop the best strategy for raspberry crown borer control.

Brigade: This is a restricted use material so may only be applied by licensed applicators. Apply as soil drench in at least 200 gallons water. During the growing season, destroy dying canes and those showing evidence of infestation. Eradicate wild brambles in the area, because they may harbor the pest.]

(Source: Ontario Berry Grower, Nov. 2010 – reprinted with adapted information for New England Audience)

BLUEBERRY

Timely Blueberry Disease Control

Strategies to control bacterial canker in blueberries should start in the fall

Jay Pscheidt, Oregon State University

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.

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 2013)



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

GRAPE

Grape Post-Harvest Checklist

Jodi Creasap-Gee, Cornell University

I pulled out last year's post-harvest checklist and noticed the last step was to "Have a great Thanksgiving!" This is just another reminder of how far ahead we are this season. Sheesh, I can barely throw a "Happy

Halloween!" out there at this point. Regardless, the end of harvest is here (or almost here, for some growers and winemakers), and it is time to review the list of things to do after harvest. Applicable to both juice and wine grape

production, this list may or may not be comprehensive for all vineyard businesses. Either way, I hope it serves as a reminder of what needs to be done.

This year was a tough one. Spring started early, and then was interrupted by the return of winter in the form of several freeze events. Followed by a short spring, a long, dry summer ripened the small crop, which was then threatened by harvest rains. Luckily, growers are adaptable and made it through with relatively good quality fruit and a relatively cheerful industry.

- 1) If the ground is not frozen and you have not done so already, take some soil samples in the blocks throughout your vineyard. Stop in the office, and we can go through vineyard maps to create a soil sampling strategy for your vineyards.
- 2) Collect, clean, and store all bins properly, preferably under cover.
- 3) How much is your equipment worth to you? Vineyard equipment is expensive and essential, so take good care of it. Clean, winterize, oil, grease, and properly store vineyard equipment that is not to be used again until spring.
- 4) Grab your vineyard maps and take a tour (in truck – good; on Gator – better; on foot – best) of your vineyards to identify/evaluate trouble spots – damaged posts, skips, ruts between rows, broken drainage tile, etc.. [If vines need replaced, record what and where and either order plants now or mark vines for layering. Grafted vines should be planned for planting 2 years in advance.]
- 5) If you had weed problems this year, you might want to try a fall application of Roundup after the leaves drop from the vines. Remember, use of several 2, 4-D formulations is illegal in the Western New York Grape growing counties, so double-check formulations and regulations prior to applications to eliminate broad-leaf weeds.
- 6) If you have new vineyards that are clean tilled, it might not be too late to get a winter cover planted, but one can consider planting some grass or a cover crop on the soil for next year to prevent erosion, improve organic matter, and break up compaction. The standard types of grasses used are rye, barley or oats. These are not permanent covers and, when taken down, they will enhance the fertility of your soils. Remember, the higher the organic matter in your soil, the less nitrogen you need to apply pre-bloom. You can plant a permanent cover of durable slow and low growers like creeping red fescue, especially if vine vigor is a chronic problem, but this can be expensive.
- 7) Business management: Collect your weight tickets or whatever you use to calculate your charges. If need be, check and double-check your contracts and

numbers. If there are issues related to the contract, you can either take that up with the winery or processor now or a little later. [Send itemized invoices out to the wineries with payment terms.]

- 8) Be sure to record trouble spots in each block, be it a downy mildew (unlikely this year), powdery mildew, or phomopsis problem from this year. Losing leaves to disease only skews the leaf-to-fruit ratio, thereby making ripening more difficult in these “high yield and minimum standards” times. Being on top of sprays right out of the gate next spring will keep the vines cleaner and healthier and more productive. A healthy vine can be a productive vine.
- 9) Many growers are thinking about pruning, are you? Is your equipment ready, and do you know who will be pruning and what their skill level is? Is this year the year you need to consider mechanical pruning? Pruning sets the tone for quality in 2013; we had fairly bud development weather in 2012 (depending on levels of drought stress in each vineyard), plus a small crop so crop potential might be higher than average in 2013.
- 10) Tag vines with red leaves or white varieties with leaf curl, crown gall. These may or may not be candidates for virus – be sure to check the trunk for damage or crown gall. If the trunk is clean, tag and test the vine for the presence of viruses. They should be pulled if they test positive for virus, or you should plan to renew trunks if tumors or injuries are present.
- 11) For grafted plants, hybrid or vinifera, you will need to hill up vineyard soil with a grape hoe to insulate the graft unions. Recall that the graft union is essentially a weak spot – like scar tissue – that is more sensitive to cold temperatures. Sure, we had a fairly mild winter last year, but that doesn’t mean Mother Nature won’t surprise us this winter. Hill up 5” to 6” of dirt over the union. Other options include straw and mulch. The lighter the material, the more volume you need to protect the vine. Hilling up can be tricky, and this is where laser-planted vineyards can be very nice – the straight rows allow for relatively easy hilling up and taking down of soil. Ask someone who’s experienced in hilling up, if need be, and remember that weed management needs to be spot-on, and soil conditions should be just right (not too wet or dry).
- 12) If applicable, talk to winemakers to request samples of your wines, especially the lots that are not yet blended. Talk to the winemaker who buys your fruit and discuss the season, the fruit quality, and assess if anything needs to be done differently next year. Wine grapes bring more money because more work is required to make high quality fruit for fine wines. Your grapes represent this region – you certainly would prefer a positive perception of good quality

fruit and wine, right? It's kitschy, but true: Quality starts in the vineyard, and it is essential to forge a relationship with the winemaker to whom you are selling fruit.

- 13) When you have the time, sit down and review the season carefully. Figure out what worked and what didn't, and remember that if you were trying something new in your blocks, it usually takes almost 3 full seasons to see a statistically significant difference in treatments. Again, record trouble spots (disease, insects, frost pockets, etc.) and plan to manage your blocks accordingly for next year. Will you leave more buds on and plan to crop thin 30 days post bloom? Or will you plan to leave fewer buds on this year? One of the keys to vineyard management is managing on a yearly basis – every year is different, so you may not always have the same management

plan from year to year. How was vineyard nutrition? Did you get your soil and petiole tests completed and recommendations back? Petiole tests showed artificially low potassium levels, due to the dry season. Plan for nutrient amendment applications to build up soil health. Should anything be done differently for next year for vineyard floor management? Finally, you are running a business, so assess the health of the business. Did you make money? Did you sell your entire crop? Take a long, hard look at this and determine where you can improve efficiency and profitability without cutting corners at the expense of vine health.

Many thanks to Mark Chien, Penn State Extension Viticulturalist, for allowing me to adapt from his post-harvest checklist. (Source: Lake Erie Regional Crop Update, Oct.4, 2012)

GENERAL INFORMATION

Plan Now For Winter Storage Of Pesticides

Christina Curell, Michigan State University Extension

For farmers, the busiest time of the year is the fall. Adding something else seems to be intolerable, for those farms that have extra pesticides winter storage needs to be added to the long chore list. The best way to ensure that there is no chance of pesticide problems is to return any extra product to a pesticide dealer. If returning pesticide to a dealer is not an option, farms need to have proper pesticide storage. When pesticides are not properly stored there is a chance that products could freeze, containers could be compromised, posing a threat to people, livestock, and the environment.

The easiest way to reduce the risk of pesticide exposure to humans, livestock, and the environment is to have proper pesticide storage. The ideal storage is one that is separate from any other activities. The building should be locked, have a spill kit and a chemical fire extinguisher. The floor should be sealed, with concrete curbs to contain any spills. The building should be clearly marked as pesticide storage. If a farm is unable to dedicate a building for pesticide storage at the very least there should be a cabinet dedicated to storing pesticides. As with the building, the cabinet needs to be locked and clearly labeled as pesticide storage.

Once the storage location is set farmers need to be concerned with how they store pesticides. Shelving units should be metal or plastic with a lip. Wood should not be used since it will absorb spills. It is also important to put any dry formulations on the top shelves above any liquids to prevent cross contamination if liquid containers leak.

Pesticides should be separated by type i.e. herbicides, insecticides, fungicides, etc. The oldest product should be in front so that it will be used first next spring. It is also very important that all pesticides are clearly labeled. If the label is missing or unreadable contact your chemical dealer or visit the [Crop Data Management System](#) to obtain a new label. Remember to affix the label on the container.

There are instances when a farm has outdated, unusable, or even banned pesticides. In these cases pesticides can be taken to a [Clean Sweep](#) site. Clean Sweep accepts unwanted pesticides and disposes of them properly. This is a free service funded through the [Michigan Department of Agriculture and Rural Development](#) to all residents in Michigan. [Note: for a list of state Clean Sweep coordinators, see: www.epa.gov/opp00001/regulating/disposal_contacts.htm]

To find out more information on proper pesticide storage get a copy of “*On-farm Agrichemical Storage and Handling*”, Michigan State University Extension bulletin E-2355 from the MSU [Extension Bookstore](#). For more information on storage of pesticides and a guide for proper storage temperature of common pesticides obtain a copy of University of Wyoming Extension bulletin MP-93.5, “*Cold Weather Storage and Handling of Liquid Pesticides.*” (Source: Michigan News for Agriculture, Oct. 5, 2011)

Winterizing Your Drip Irrigation System

Bill Lamont, Penn State University

Pumpkin, broccoli, potato and apple harvest signals to me that cooler weather is coming around the corner. Having worked many years with irrigation systems and drip irrigation systems in particular, I wanted to share with you some tips on winterizing irrigation systems so that it will be ready for next spring. Drip irrigation systems all use valves, filters, plastic fittings, PVC pipe, poly pipe, or layflat hoses that can easily burst if water freezes inside any of these components. I know this from personal experience and it can drive you crazy. This can prove costly to replace or repair.

Winterizing a drip irrigation system will take about fifteen minutes to an hour, and is best done before the first freeze. A little of your time spent now will result in a low maintenance irrigation system that will reduce the need for replacing frozen parts. In extremely cold winters, freezing temperatures can severely damage your irrigation system and all the main water lines.

The goal in winterizing your drip irrigation system is to shut off the water supply to the system, and flush all of the water that is left in the system from the backflow device, valves, filters, main lines, sub-lateral lines, sprinklers, drippers, and drip line.

One way to make sure that the system will not freeze (flat terrain) is to install automatic drain valves in the lowest point of the system. The drain valve assures that any water in the line will drain out. This is extremely important. Also in a drip irrigation system, I like to run some chorine (2 PPM) through the system and then flush it out thoroughly to clean everything up before storing it for the winter.

About the parts of the irrigation system:

Pumps - Always drain a pump by opening the lowest plug or drain outlet (replace with drain valve). Make sure to check that no water is left inside.

Drain plugs usually are extremely difficult to remove, not to mention difficult to get to, making an unpleasant project out of a simple task.

For some of our portable drip irrigation trailer units (engine and pump located on a trailer) and with drip irrigation systems fed from a pond or a stream, drain the suction line. That is pull it out of the water, drain it and cover the open ends to prevent creatures from making it a winter home. Also the open end of the pump where the suction line connects needs to be covered so that rocks, pebbles, nutshells, leaves, and animals from mice to snakes can find their way into the impeller. Simply covering open ends will save time and headaches. This I also know from personal experience.

Valves and valve assembly - I also know from personal experience that gate and ball valves will not

tolerate freezing. A gate valve, when closed, traps water in the bonnet. A ball valve holds water inside the ball. If the valve is closed when water is in the line and the line is drained without opening this valve, the water trapped above the gate or inside the ball will freeze and have no place to expand. The signs of freezing are very distinctive: a ball valve will burst the side out, and a gate valve will split its bonnet, packing nut, or have a hairline crack down its side. To replace a three-inch brass gate valve is not cheap.

With solenoid valves it is best winterized by leaving them open for the winter. The manual bleed lever on the valves varies by model and manufacturer, but is usually a thumb type screw on top of the valve or lever on the side of the bonnet (cover).

Automatic control valves such as pressure reducing, pressure relief or combination valves, containing external control tubing, pilots, and other parts will require special care to thoroughly drain. If the entire unit can be easily removed from the pipe, it may be simple to store the unit in an inside location for the winter. This is the method that I prefer. If removing the valve or valve assembly is not practical, then from the pressure-reducing valve remove the control tubing connections in the lower part of the valve to drain all the parts of water. The valve bonnet should also be loosened or removed to remove all the water from the top of the diaphragm by un-tightening the screws on the top of the bonnet.

Valve assemblies such as battery operated controllers or AC valves with filter, pressure regulator, and swivel adapter; also require special care to thoroughly drain. If the entire assembly can be easily removed from the pipe, it may be simple to store the assembly unit from the controller to the pressure regulator in an inside location for the winter. If removing the filter assembly or valve assembly is not practical, the valve bonnet should be loosened or removed to remove all the water from the top of the diaphragm, the filter cap should be removed from the filter, and remove the filter cover and screen to make sure that no water is left inside any part of the assembly.

Drip Tape - First disconnect the drip tape from the laterals and in most cases it is disposed of as it is considered an annual expensed item.

Poly pipe hose and vinyl layflat hose - Poly pipe and layflat hose have to be drained. Layflat or poly pipe hose can be lifted few feet at a time and section-by-section, making sure that any water left in the hose will drain out. After you finish draining the layflat hose or poly pipe hose and the micro tubing or connectors,

make sure to close the ends of the hoses using the hose ends. The layflat hose definitely is easier to roll up and can be automated on a spool than the poly pipe hose.

Summary

The best prevention I have found once the system is drained completely is to take those parts of the system that are prone to damage inside a building. That is the nice thing with our trailer mounted portable pumping

and filtering units used at the Horticulture Farm, which can be drained and then moved into a building for storage during the winter. The vinyl layflat hose or poly pipe hose with connectors is cleaned up and rolled up and stored so the mice and rodents will not bother it. We are ready for the spring. (**Source:** *Penn State Veg & Small Fruit Gazette*, Oct. 2011)

White Pine Blister Rust: A New Strain Has Developed

Nicholas Brazeo, UMass Extension

White pine blister rust (WPBR), caused by the fungus *Cronartium ribicola*, is an aggressive and non-native pathogen that was introduced into eastern North America in 1909. Since its introduction into North America, the pathogen has killed millions of five-needle pines and has nearly eliminated western white pine throughout much of its native range. While New England has only one native five-needle pine, eastern white pine (*Pinus strobus*), this species is abundant and widespread in forested and managed landscapes. While the environmental conditions required for disease development are not as easily satisfied here as they are in western North America, WPBR has killed countless white pines over the past century in New England.

All rust fungi require two botanically unrelated hosts to complete their life cycle. In New England, the WPBR fungus also infects species in the genus *Ribes*, commonly known as gooseberry and currant. *Ribes* are small, woody shrubs that are native to New England forests. However, the introduced European black currant (*R. nigrum*) was widely planted for berry production and is especially susceptible to the disease. As a result, the import, cultivation, sale and planting of black currant was outlawed under a federal quarantine and eradication ban enacted in the 1920s. After an intensive program of manual eradication lasting from the 1920s through the 1950s, the *Ribes* population was significantly reduced in New England. Consequently, the federal ban on *Ribes* cultivation and sale was lifted in the 1960s. Despite the relaxation of the federal ban, state quarantine and eradication laws still exist today in many eastern states, including Massachusetts.

In the early 2000s, the pressure to lift the ban on cultivation and sale of *Ribes* intensified, led by commercial berry growers. Numerous varieties of currants and gooseberries with immunity to WPBR had been developed and were marketed as safe for commercial berry production. As a result, Massachusetts law was modified to allow the cultivation and sale of *Ribes* in certain towns after a formal permitting process. Currently, 144/351 cities and towns in the Commonwealth of Massachusetts still prohibit planting of currants and gooseberries (1). Since

the modification of the *Ribes* ban in Massachusetts, commercial production of currants and gooseberries continues to increase as berry growers expand into this niche market.

In 2008, researchers in Connecticut observed the WPBR pathogen on black currant bred for immunity to the disease (2). In light of this discovery, researchers in eastern Canada began surveying rust populations in



Figure 1. *Cronartium ribicola* symptoms on Jostaberry leaves.

New England and eastern Canada to determine if a new strain of the fungus had been introduced. The researchers determined that it wasn't a newly introduced strain, but a more troubling scenario; a new, virulent strain of the pathogen had naturally developed in northeastern North America. Through genetic mutation, the new strain of the pathogen is capable of infecting numerous cultivars of black currant that were bred for immunity to the disease. These previously immune *Ribes* cultivars have been widely planted by commercial berry growers. Survey results confirm the new strain has been detected in New York, New

Hampshire, Quebec and New Brunswick and Nova Scotia, in addition to Connecticut.

Widespread concern now exists that WPBR will once again become a serious threat for the long-term health of eastern white pine in New England. Young white pines are more susceptible to the disease because the environmental conditions required for disease development occur most often closer to the ground (high humidity and shade with free moisture on plant surfaces). While the majority of our white pine population is mature and less susceptible, a considerable number of young white pines exist in our forests and managed landscapes. Symptoms of the disease include top dieback, browning needles and the presence of stem and trunk lesions accompanied by copious resin flow. The lesions may appear as numerous rupturing blisters with oozing and hardened resin. Insect infestation may often be visible near the lesions. The fungus invades the tree through the needles and slowly progresses downward to the twigs and branches before finally girdling the main trunk. No control measures exist for the pathogen on white pine and spores have been documented to travel several miles. However, chemical control of the fungus on *Ribes* is possible if performed properly by commercial growers.

In light of these new findings, the state of New Hampshire imposed a new moratorium in 2012 banning

the planting of currants and gooseberries until further surveying for the new strain can be completed (3). To date, the laws managing the cultivation and sale of *Ribes* in Massachusetts have not been changed to reflect the altered dynamics of WPBR. One of the conditions of legalized cultivation and sale of *Ribes* in Massachusetts and additional northeastern states was that all *Ribes* cultivars would be immune to WPBR. Now that disease immunity has been broken by the fungal pathogen, the law needs to be reexamined before WPBR becomes an epidemic once more.

References:

- (1) Currants and Gooseberries: Prohibited Towns in Massachusetts. 2012. [http://extension.umass.edu/landscape/sites/landscape/files/publications/currants_gooseberries_prohibited_town_s.pdf]
- (2) Frederick, ZA, et al. 2011. First Report of White Pine Blister Rust Caused by *Cronartium ribicola* on Immune Black Currant *Ribes nigrum* Cv. Titania in Preston, Connecticut. *Plant Disease* 95(12): 1589. [<http://apsjournals.apsnet.org/doi/abs/10.1094/PDIS-07-11-0609>]
- (3) Moratorium on Planting Currants and Gooseberries in New Hampshire. 2012. [<http://www.agriculture.nh.gov/documents/Ribes.pdf>]

UPCOMING MEETINGS:

Oct. 16, 2013 – *UMass Extension Greenhouse Crops and Floriculture Program – Fall Flower Grower's Program*. Pioneer Gardens Inc. 198 Mill Village Road, Deerfield, MA. For more information contact Bob Luczai, MFGA: 781-275-4811 or Tina Smith, UMass Extension: 413-545-5306 or go to: <http://extension.umass.edu/floriculture/events/fall-flower-growers-program>.

Oct. 17, 2013 – *Organic Cover Crop Workshop and Tour*. 10am – 4PM. USDA-NRCS Big Flats Plant Materials Center, 3266 RT 352 Big Flats NY. For more information contact Paul Salon, USDA-NRCS, 607-562-8404, paul.salon@ny.usda.gov. or go to <http://www.nofany.org/events/field-days/update-organic-cover-crop-workshop-and-tour>

Oct. 30, 2013 – *North Country Fruit & Vegetable Seminar & Trade Show*. 9AM – 3:30PM. Mountain View Gran, Whitefield NH. \$14 Pesticide Credit offered. For more information go to: <http://extension.unh.edu/events/files/62C8A8D4-9B21-EBAD-2990568DFFE2E9DB.pdf>.

December 3-5, 2013 - *Introduction to Hazard Analysis of Critical Control Points (HACCP)*. UMass Amherst Campus Center, Amherst, MA. This course covers the fundamentals of HACCP (Hazard Analysis Critical Control Point) taught by certified International HACCP Alliance instructors. This particular course will have an emphasis on fresh-cut produce, beverages (including juice and cider), baked goods, and dairy products. The concepts will be reinforced by breakout group activities in which participants will have the opportunity to prepare a HACCP plan. All participants will receive an International HACCP Alliance certificate issued through the University of Massachusetts upon successful completion of the course. For cost and registration information, go to: <http://ag.umass.edu/events/introduction-hazard-analysis-critical-control-points-haccp>.

December 17-19, 2013 – *New England Vegetable & Fruit Conference*. Radisson Hotel, 700 Elm St., Manchester NH. For the full program and registration information, go to: <http://www.newenglandvfc.org>.

January 27, 2014 – Vt. Vegetable and Berry Growers Assoc. Annual Meeting. Montpelier VT. More info to come.

February 15-17, 2014 – NOFA-VT Winter Conference. Burlington VT. More info to come.

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