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Berry Notes

Prepared by the University of Massachusetts Fruit Team

October 2014 Vol. 26, No. 10

www.umass.edu/fruitadvisor/berrynotes/index.html

Massachusetts Berry Notes Underwriters:



Berry Notes is edited by Sonia Schloemann with articles written by other contributors with attribution; sources are cited. Publication is funded in part by the UMass Extension Agriculture & Landscape Program, subscription fees and generous underwriting. Questions can be directed to Sonia Schloemann at 413-545-4347, sgs@umext.umass.edu. Please cite this source if reprinting information that originates here.

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SHORTS:

VENDORS NEEDED FOR YEAR-ROUND MARKET - The Boston Public Market -- a year-round indoor market featuring local farmers, fishermen, and specialty food Producers -- is seeking local growers with the capacity to provide produce year-round as permanent full-time vendors. With a focus on entirely New England-sourced products, the market will be the first of its kind in the United States when it opens next summer. To learn more about the Boston Public Market and vendor opportunities, visit www.bostonpublicmarket.org or call Tiffani Emig at 617-973-4909.

NEW VIDEO CLIP GIVES BEGINNING FARMERS INSIDE LOOK AT ORCHARD MANAGEMENT - If you dream of growing apples, pears, or other fruit, Black Diamond Farm in Trumansburg, NY might look like heaven to you. Run by Cornell Professor Emeritus Ian Merwin and his wife Jackie, Black Diamond markets well over 100 varieties of apple, asian pears, and stone fruit direct to customers at the Ithaca Farmers' Market. Check out our second video in our series of 3 orchard management videos, just published to our YouTube site. It covers the timely topics of harvest, storage, and marketing fruit. [View the video here.](#)

WINTER WEDNESDAY LUNCH SERIES – Vegetable and Small Fruit Production Webinars by Penn State. Topics include Hydroponic Vegetable Production, Current Issues in Strawberry Pest Management, Soil Health Through Reduced Tillage and Cover Crops, Using Sanitizers in Wash Water, and Tomato Nutrition in High Tunnels. For dates and registration information go to www.extension.psu.edu/vegetable-fruit/winter-webinars.

VIDEOS OF COVER CROPPING FARM TOURS - NCAT has archived videos of a series of farm tours across Montana this summer focused on cover cropping. The tours ranged from a diversified organic grains operation and a small vegetable, flower, and seed farm, to a crop and livestock operation just beginning to use cover crops. The tours also included a cover-crop research plot being operated by Montana State University researchers. Click [this link](#) will to view this video.

STRAWBERRY

Disease Snapshot: Strawberry Red Stele Root Rot

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

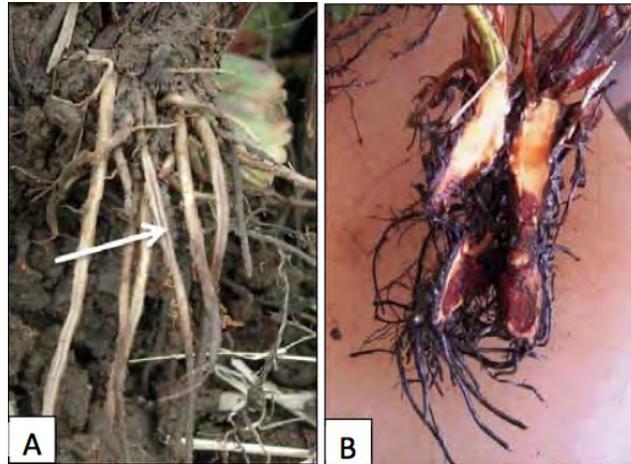
Causes: *Phytophthora fragariae*

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)

Optimizing Strawberry Production with a Zone Tillage System

Laura McDermott, CCE Eastern NY Commercial Horticulture Program

The reduced-till system uses a sub-soiler to loosen soil deeply followed by coulters and a rolling basket that prepare a 6-10” wide seedbed. This zone tillage technique allows the longer rooted strawberry plant to be correctly planted while still having minimum disturbance between the rows. By only tilling this narrow area, the chance of new weed seeds being brought to the surface for germination is reduced. Because the strawberry plants will get off to a good start, they should out-compete weed competitors in the tilled zone. The addition of the shank allows for improved water drainage therefore reducing disease pressure from soil borne diseases like *Phytophthora* fruit rot. The use of reduced tillage tools usually requires a single trip across a field for it to be fitted for planting – an important advantage that translates into less labor, reduced fuel consumption and a decreased risk of soil compaction.



Our trial on 3 farms showed variable success with weed control and little impact on yield. However, from a farm



profitability perspective, labor savings just for tillage averaged 37% and fuel savings 40% for the reduced tillage system compared to primary tillage for field preparation. The range reported by growers for savings in

fuel ranged from 27 to 60% and savings in labor costs ranged from 25 to 60%. These figures are estimates from agronomic crops and some larger scale vegetable crops, but similar savings could be found on strawberries.

The reduced tillage approach would be more attractive if we could prove that yield of this high value crop would not suffer. The results from this study imply that farmers should experiment with reduced till in their matted row strawberries in order to maximize production and minimize costs.

Participating farmers: Tim Stanton, Stanton's Feura Farm; Al Lansing, Lansing Farm; Eric and Stephanie Gray, Gray's Farm Market. Funding from NE SARE

(*Source: New York Berry News. Vol. 12., No. 9. Oct. 2014*)

Using Bio-Control Nematodes to Manage Strawberry Root Weevil

Laura McDermott, CCE Eastern NY Commercial Horticulture Program

Last fall, a northern NY grower applied entomopathogenic nematodes to his field to assist in controlling the root weevil complex that consists of Strawberry root weevil, *Otiorhynchus ovatus* (SRW) and Black vine weevil, *O. sulcatus* (BVW). ENYCHP educators Amy Ivy and Laura McDermott participated in the application under the direction of Dr. Elson Shields and Tony Testa.



The biocontrol nematodes being used in this study are native and have been found to control alfalfa snout beetle across northern NY. The beneficial nematodes are applied in the evening to avoid desiccation. The grower was able to apply the nematodes using his boom sprayer with all the filters and screens removed from the nozzles. The grower left a control plot, so it will be relatively easy to see if these nematodes have an effect. The most time consuming part of the application process was screening

and rinsing the nematodes out of the substrate they have been raised in.

BVW is the larger of the two weevils and the more likely to be the problem as it has a larger host complex. The adult beetle has small yellow patches on its back. They feed on foliage, leaving characteristic notch marks on leaf margins, although this damage is usually insignificant to plant vitality, it is valuable for detecting their presence. They are 1/4- to 1/2-inch long. The larvae are white with tan heads, and have no legs. They feed on small roots and can quickly reduce the vigor of plants, causing plant death if larvae are numerous.



Adult BVW and larvae, upper left; Adult Strawberry root weevil and larvae, lower right



BVW adult feeding on strawberry leaves; note characteristic notching.

Adult root weevils can still be present after harvest; however traditional chemical control measures of the adults should be taken early before egg laying begins in late spring. Eggs that were laid in the soil prior to or during harvest will hatch into young larvae that begin feeding on roots this fall. Root weevil larvae overwinter two to eight inches deep in the soil. You can actually scout for root weevil larvae now, but they are even smaller than in the spring and very difficult to see.

The weevils attack roots of high value horticulture crops, and over a few years will cause rapid decline and eventual plant death.

To scout for these pests, follow the protocol below:

In the spring, watch for areas of weak growth. Dig in the root zones, checking for the white grub like root weevil larvae.

When weevil adults emerge, watch for leaf notching especially on sucker growth near the ground.

After dark on warm, calm nights, scout fields with a flashlight. Black vine and strawberry root weevils will be found feeding on top of the foliage.

Look for adults in the dead plant material and weeds at the base of plants.

In the fall, check areas that show weak growth and redden prematurely. The larvae be found in the fall but are much smaller than in the spring.

Participating Farmers: Bob Rulf, Rulf's Orchard
Funding: NNY Capacity Building Grant

Editor's Note: This is a summary and the one that follows are from talks given at the October 3, 2014 Cornell Small Fruit Open House in Ithaca, NY; they are reprinted here for the benefit of those who were not able to attend in person.

(Source: New York Berry News. Vol. 12., No. 9. Oct. 2014)

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.

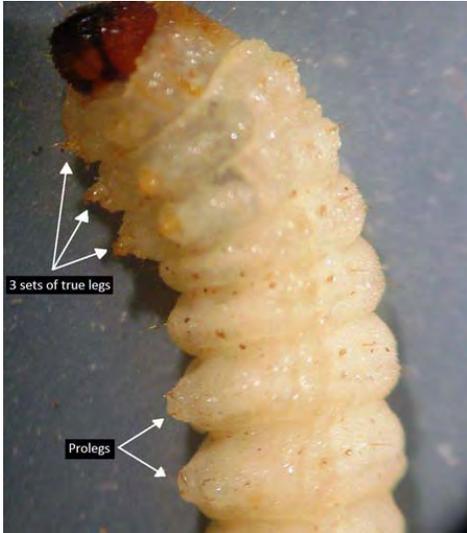


Fig 2. Raspberry crown borer larva from the side showing its 3 sets of true legs close to the light brown head. Only 2 or 4 pairs of prolegs are shown.

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.



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

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)

Using Exclusion Netting to Control Spotted Wing Drosophila in Blueberries

Laura McDermott, CCE Eastern NY Commercial Horticulture Program

Two farmers in eastern NY have received NE SARE farmer grants to look at exclusion netting. This material, a Pro-Tek 80g net, was shown in the lab to exclude SWD adults. The purpose of the trials was to examine and perfect the system and to insure that the netting did not cause any damage to the berries in terms of plant growth and/or yield. In the first trial, each row of plants were covered, which resulted in excellent insect control with no effect on berry quality or overall yield. In the second trial, the entire planting was covered and it was determined that the 80g net performed much better than the 60g material, which excluded SWD only a week more than the control.

The cost of covering an acre of blueberry planting with insect netting would likely approach \$10,000/acre depending on the support system used. The life of the net is 7 years, so the amortized cost per year is \$1428, not including labor.

Participating Farmers: Lawrie Nickerson, Hay Berry Farm; Dale Ila Riggs, The Berry Patch. Funding from NE SARE .

(Source: New York Berry News. Vol. 12., No. 9. Oct. 2014)



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*)

Vole Management in Berry Plantings

Cathy Heidenreich, Cornell University

Voles, also known as meadow or field mice, can do a lot of damage to bushberry and caneberry plants during winter months from feeding on plant roots to girdling canes and gnawing on crowns below the snow cover. Population monitoring and management can help reduce losses incurred to blueberries, raspberries and blackberries and other berry crops by these small mammals.



Figure 1. Vole feeding on apple. Photo courtesy P. Curtis.

Vole Life History and Management

Twenty-three species of voles occur in the United States. Meadow voles and Pine Voles are of the greatest economic importance to fruit growers. Most voles range in size from 5 to 9 inches in length, and 1 to 2 ounces in weight. They are generally gray-brown in color with grayish under parts. Compact is the term that best describes voles, which are stocky rodents with short legs and tails. These features, combined with small eyes and partially hidden ears make them ultimate tunnelers.



Figure 2. Pine Vole tunnel. Photo courtesy I. Merwin.

Home range for voles is usually one acre or less but this varies with food supply, population density, and other factors. Pine voles spend their days underground creating systems of subterranean tunnels and runways (Figure 2). These tunnels are used to feed on plant roots, store food, and raise young (Figure 3). Tunnels have numerous surface entrances and a single burrow system may provide habitat for several adults and young.

Nocturnally active also, Meadow voles travel and feed at night along surface runways above ground. Runways consist of 1 inch wide depressions or matted trails in grass and ground cover that have characteristically close clipped vegetation and contain feces and bits of chewed debris.

Voles do not hibernate, reproducing for most of the year with peaks occurring in the spring and fall. Highly prolific, voles produce 1 to 5 litters per year with litters ranging in size from 3-11 young; average litter size is 3 to 6. Females are reproductively mature in 35 to 40 days. Young voles reach maturity within 21 days.

Vole lifespan is relatively short, ranging from 2 to 16 months. Populations tend to be cyclic with peaks occurring every 2 to 5 years. Cold winters can greatly reduce vole population numbers. Numbers are also affected by other climatic conditions and food supply.



Figure 3. Meadow Vole nest in the grass. Photo courtesy P. Curtis.

Voles feed on a wide variety of plants but most commonly feed on grasses and forages. Other plant food sources include seeds, tubers, bulbs, and rhizomes. They are also known to occasionally feed on insects, snails, and animal remains.

The preferred habitat for most voles is an area with heavy cover (grasses, grass-like plants, leaf debris, mulch or litter). When populations are high they may spill over from these habitats into fruit plantings, wind breaks, and cultivated fields.



Figure 4. Meadow Vole (right) and PineVole (left). Photo courtesy I. Merwin.

The two types of voles most common to our area are the Meadow vole (*Microtus pennsylvanicus*) and the Pine or Woodland vole (*M. pinetorum*). (Figure 4) The Meadow vole is the most common species found in the northern US and Canada. Ranging in size from 5.5 to 7.5 inches in length the meadow vole has gray to yellow brown fur with black-tipped hairs. Northern subspecies of this mammal may have reddish fur overtones. Meadow vole under parts are gray, sometimes washed with silver or buff; its tail is bicolored. Preferred habitats for *M. pennsylvanicus* are wet meadows and grasslands.

Pine vole, common to the eastern US, is smaller than Meadow vole, ranging in size from 4 to 6 inches in length. These voles are brown in color with soft dense fur. Under parts are gray mixed with yellow to cinnamon. The tail is one colored or just slightly bicolored. Pine vole's preferred habitats include deciduous and pine forests, abandoned fields, and orchards with heavy ground cover.

In terms of quick ID, the tail is shorter than hind foot length for pine voles and larger than hind foot length for meadow voles.

Trapping is an effective way to positively identify vole species present in an area. A snap-type mouse trap is sufficient for this purpose. Bait the trap with a small piece of apple. Some excavation may be needed to position traps in pine vole runs (Figure 5). Place a bent roof shingle over the trap to form a protective cover for the trap. Allow sufficient height between the trap and the shingle roof for the trap to spring without hitting.

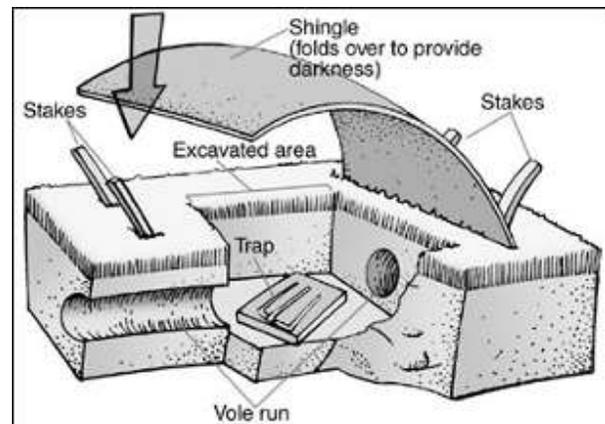


Figure 5. Pine Vole trape (Pierce, 2003)

Meadow vole traps should be placed at right angles to surface runways or back to back inside runs (Figure 6).

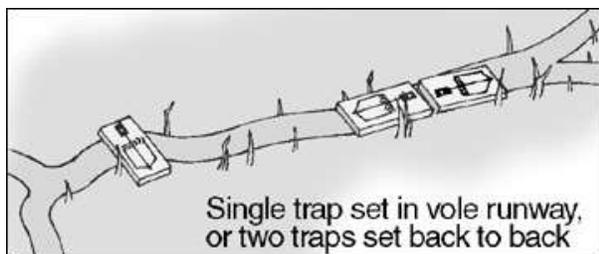


Figure 6. Meadow Vole trap (Pierce 2003).

Recognizing Vole Damage to Berry Crops

Pine voles feed on berry crop roots, and Meadow voles girdle berry root crowns and canes. Girdling typically occurs in fall and winter. Damage may also occur to irrigation systems through voles chewing on tubing.

Girdling alone is not solely indicative of vole damage to bush and caneberreries. Rabbits and other rodents may also girdle berry plants. Vole girdling is typically 1/8" wide by 3/8" long and 1/16" deep. Marks occur at various angles and in irregular patches. This type of feeding, coupled with evidence of extensive burrowing, burrow entrances and surface runways may indicate Meadow vole damage. Pine vole spends most of its time and causes its damage below ground. In comparison, Meadow vole spends considerable time and causes most of its damage above ground.

Extensive vole tunneling also creates air pockets in the root zone and may disrupt water movement through the planting.

Monitoring Vole Damage and Making Management Decisions

Monitoring may be done in spring, summer, and fall to track vole population changes. Fall monitoring however, is most often used in making management decisions. Monitoring should be done when temperatures are still above freezing during a period with little or no rainfall. Construct monitoring stations consisting of pieces of roofing shingle or other material to provide shelter. Place shelters over a tunnel entrance or section of runway. An apple wedge serves as bait under the shelter. Set out 4 to 8 monitoring stations per acre. Check apple wedges 24 hours after placement for evidence of feeding. If inclement weather is a factor, leave bait stations with wedges in place to allow ample time for night feeding. Score each station as positive or negative for feeding. In general, management is recommended when 15% or more of the bait stations show positive feeding damage after 24 hours. For more in-depth information on this technique see: Integrated Pest Management for Blueberries - A Guide to Sampling and Decision Making for Key Blueberry Pests in Northwest Washington. <http://whatcom.wsu.edu/ipm/blue/>.

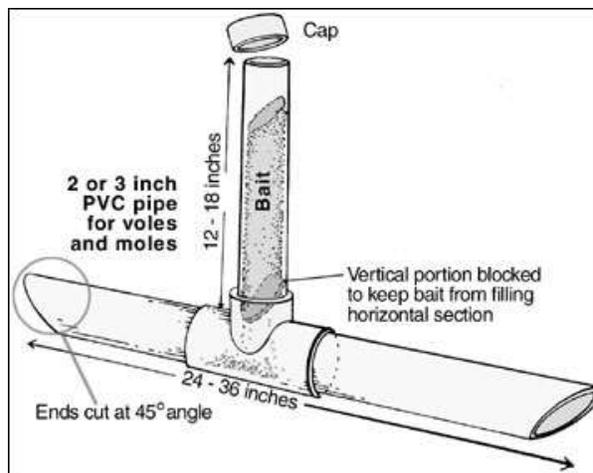


Figure 7. Bait station diagram (Pierce, 2003). Note: Meadow Voles will sometimes not use these types of bait applicators.



Figure 8. Roofing shingle cover over baited surface runway. Photo courtesy M. Fargione.

Vole Management Strategies

Cultural practices are effective in reducing vole populations in berry plantings. Weeds, ground cover and litter should be eliminated around bushes as much as possible. Grass alleyways should be mowed regularly, especially in spring and fall. Mulch used for weed management should not excessively cover bases of canes or crowns.

Voles are excellent swimmers. Unmanaged waterways, rights-of-way, and ditch banks provide excellent vole habitat. Manage these adjoining areas carefully to reduce vole numbers. Keeping surrounding vegetation to a minimum through mowing, spraying, or grazing may also reduce vole populations. Tillage of surrounding non-berry crop areas also helps reduce vole damage. Tilling removes cover, kills some voles outright, and destroys burrows.

In addition to cultural practices, some growers opt to use pelletized baits with rodenticides to further reduce vole populations. These products may be broadcast applied to whole plantings or applied by hand near entrance holes and in runways. Broadcast and hand applications, while easier to implement, have been found to be generally less effective than bait station use. Broadcast baits tend to degrade more quickly as they have full exposure to the environment. Moreover, their wide dispersal causes less frequent vole ingestion/exposure. This in turn may lead to bait-shyness through ingestion of sub-lethal doses of the bait. Broadcast baits should not be applied to areas with bare ground as this may increase non-target animal consumption.

Rodenticide bait stations protect bait from moisture and reduce the likelihood of bait consumption by non-target animals. Stations should be activated in fall if population numbers are high and maintained through spring if populations remain high during winter months.

They may be constructed from PVC pipe or other water repellent materials (Figure 7). Place bait stations at 10-ft intervals in infested areas. Repeat baiting again after 5 days. After 21 days, repeat the apple sign test to check efficacy of control measures.

Two types of rodenticide baits are currently available for vole population management: zinc phosphide containing baits which are a one-time application for quick knock down of rodent populations and baits containing anticoagulant compounds such as chlorophacinone that provide protection throughout the winter. Zinc phosphide baits such as Prozap zinc phosphide pellets or ZP Rodent bait Ag contain 2% zinc phosphide. Both products are currently registered for use on bushberries and caneberries in NY. These products are restricted use pesticides which may be purchased and applied only by certified applicators. They are acutely toxic to all vertebrates (humans, domestic animals, wildlife). Broadcast applications by cyclone seeder or hand (follow all label precautions!) of these products may only be made during the dormant season (after final harvest and before leaf emergence in the spring); PHI for bushberries and caneberries is 70 days. Hand applications should consist of throwing tablespoon amounts of bait into heavy cover along bushes, rock out crops, fence lines and runways. Make up to 2 applications at a minimum interval of 21 days, at the rate of 6 to 10 lbs. per acre (0.12– 0.2 lb. ai/A) per application. Maximum application per growing season is 20 lbs. per acre (0.4 lb. ai/A). Never apply these materials to bare soil. Zinc phosphide baits should not be applied when ground is snow-covered, or when rain or snow is forecast within 48 hours of application.

Zinc phosphide baits should reduce vole populations within 72 hours of treatment. After the vole population has been reduced, an application of anticoagulant bait will assist in reducing the number of voles repopulating the planting during winter months.

Anticoagulant baits, such as those containing chlorophacinone as an active ingredient, are more toxic to voles than to other birds and mammals. These baits have a lower percentage active ingredient (0.005%) and require multiple feeding events by voles to be effective. Risk to non-target wildlife is minimal with these products when they are use according to label directions. There is currently one anticoagulant bait product registered for use in NYS with this ai: Rozol Vole Bait (EPA number 7173-242). It may be applied to border areas/buffer strips adjacent to crops (within 100 feet of the edge of the crop land). Before application, locate vole trails, runway systems, and harborage areas to be treated. Rozol must be applied by **“Hand Spot Baiting” only in NY. Place 1 ½ ounces** (6 tablespoons) of bait in each active hole, trail or runway; cover each placement with a shingle or grass to avoid exposing non-target organisms, or place in a tamper resistant bait station. (Figure 7). Do not exceed 10 pounds per acre.

As always, read and follow all label directions whenever applying rodenticides or other pesticide products.

References:

1. Burrows, C. L., MacConnell, C. B., Murray, T. A., and Schlamp, K.K. 2010. Integrated Pest Management for Blueberries - A Guide to Sampling and Decision Making for Key Blueberry Pests in Northwest Washington. <http://whatcom.wsu.edu/ag/comhort/nooksack/ipmweb/blue/voles.html>.
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 3. Pierce, R. A. II. 2003. Controlling Voles in Horticulture Plantings and Orchards in Missouri. University of Missouri- Columbia Agricultural Guide G9445. <http://extension.missouri.edu/explorepdf/agguides/wildlife/g09445.pdf>.
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- (Source: *New York Berry News*, Vol. 12, No. 11, Oct. 2014)

UPCOMING MEETINGS:

November 2, 2014 – *Massachusetts Cultivated Blueberry Growers Association Winter Meeting*. 12:00 – 3:00.

Harvey's Conference Center, 68 Hopkinton Rd., Rte. 135, Westborough, MA 01581. Speaker Andrew Radin, URI on Soil Analysis/Nutrition And What Those Results Mean Regarding The Health Of Blueberry Bushes. For more information and to register contact Pat Conree at: theblueberryfarm@comcast.net.

November 5-6, 2014 – *Soil Health in Vegetable Production – Farming with Nature*. 9:30 – 3:30 each day.

Immanuel Lutheran Church, Nov. 5th, 867 N. Pleasant St., Amherst MA; Nov. 6th, location tbt. Co-sponsored between UMass Extension, Northeast SARE and NRCS. Featuring Ray Archuleta, Agronomist & Soil Health Educator USDA NRCS, and Farmer panels discussing their experiences with reduced tillage, cover cropping, and crop rotations in vegetable production. More information posted soon at <https://extension.umass.edu/fruitadvisor/> and <https://extension.umass.edu/vegetable/>.

November 5-6, 2014 – *Northeast Greenhouse Conference*. Mass Mutual Center, 1277 Main St. Springfield, MA.

For more information see: <https://extension.umass.edu/vegetable/events/northeast-greenhouse-conference>.

November 17-19, 2014. *2014 Southeast Strawberry Expo*, Pinehurst Resort, Pinehurst, NC. For more information see: www.ncstrawberry.com.

December 2, 2014 – *CT Pomological Society Annual Meeting*. The Gallery Restaurant in Glastonbury. Program details available soon.

December 4-5, 2014 – *Massachusetts Farm Bureau Annual Meeting*. University of Massachusetts – Amherst, Amherst MA. For more information or to register, go to:

<http://mfbf.net/AnnualMeeting/MFBFAnnualMeetingAgenda/tabid/154/Default.aspx>.

December 10, 2014 – *Greenhouse Vegetable Production in Containers*. 9:30 – 3:45. Publick House 277 Main St.

Sturbridge, MA. \$40. Registration required. 2 pesticide license contact hours requested. For more information see: <https://extension.umass.edu/vegetable/events/greenhouse-vegetable-production-containers>

January 13, 2015 - *Massachusetts Farm to Cafeteria Conference*. College of the Holy Cross, Worcester, MA. Save the date. For more information and updates, see: <http://www.massfarmtoschool.org/conference/>.

January 15, 2015 - *CT Vegetable & Small Fruit Conference*. Maneely's Conference Center, S. Windsor. Program details available soon.

January 20 – 22, 2015 – *2015 Empire State Producers Expo*. Oncenter Convention Center, Syracuse NY. For more information or to register go to <http://nysvga.org/expo/information/>.

March 17-18, 2015 - *Tree Fruit, Berry & Grape Plant Nutrition Short Course*, Maneely's Conference Center, S. Windsor. Program details available soon.

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