



UMASS  
**EXTENSION**



# Vegetable Notes

For Vegetable Farmers in Massachusetts

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## **IN THIS ISSUE:**

- Crop Conditions
- Salvaging your Greenhouse After a Heavy Snow Storm
- Potato Virus Y: a Re-emerging Disease of Potato and Tobacco
- Grower Survey on Swede Midge
- Upcoming Events

## **CROP CONDITIONS**

It has been a tough month for winter greens production, with few sunny days and extreme cold combined with high winds. Planting and growing schedules are hard to predict due to weather extremes, and this winter, growers are reporting slow growth, even in heated greenhouses. After the many snowstorms we have had, some growers are concerned about the added snow weight on their greenhouses and high tunnels. Clearing snow from the sides of tunnels, to keep space clear for the next snowfall, has been a constant chore. Some amount of snow acts as insulation, but too much can cause problems. One grower last week was going into his greenhouses and adding extra supports especially in houses that were built close

together and were building up a lot of snow in between. Despite the snow weight, he recommended staying 2 ft. away from houses with snow removal equipment so as not to damage anything. Luckily, much of the snow we've had this season has been light weight because of the very low temperatures. This type of snow usually slides off, or can be lightly brushed off of plastic covered tunnels with a rubber squeegee on an extension pole. However, after a day or two, once the snow has melted and frozen hard or compacted, it is best to leave the snow in place for danger of damaging the cover. See the article in this issue by John Bartok, Agricultural Engineer, for more information on "Salvaging your Greenhouse after a Heavy Snow Storm." Wash stations for winter greens are often minimally heated and dark, making the work physically challenging. At a recent postharvest program sponsored by [Vermont Vegetable and Berry Growers](#), farmers who have been rebuilding their winter wash houses pointed out again and again the large south facing windows that were part of the design. People, like plants, do better in sunlight.

Other topics on grower minds are seeds. The [UMass Extension Vegetable Program Hot Water Seed Treatment](#) Service is now up and running for those of you who are looking for added peace of mind to start the season with clean and healthy seed. Follow the link to read our liability waiver and submit seeds by mail: [www.ag.umass.edu/services/hot-water-seed-treatment](http://www.ag.umass.edu/services/hot-water-seed-treatment).

## **SALVAGING YOUR GREENHOUSE AFTER A HEAVY SNOW STORM**

### **Be aware of potential hazards:**

- Sliding snow or ice
- Falling glass
- Broken frame members
- Severed electrical wires
- Leaking fuel oil or gas

### **Shut off utilities:**

- Disconnect power supply
- Shut of gas supply
- Turn of main water supply



*Luckily, much of the snow we've had has been light weight and slides off easily.*

### **Minimum structural damage:**

- Take photos
- Prop up greenhouse frame to prevent further collapse
- Add additional bracing (diagonal at corners)
- Check and tighten frame connections
- Repair glazing
- Close doors and vents
- Open drain pipes
- Provide temporary heat to keep plants from freezing
- Check and repair heating/electrical/water systems

### **Major structural damage:**

- Take photos
- Support frame members for safe entry
- Cut poly if necessary to reduce load on structure
- Clear aisles
- Remove plants to temporary structures or alternate location
- Drain water system
- Cover heating/cooling and materials handling equipment with tarps



*In the case of these low tunnels, the grower decided that snow removal would be too dangerous and may damage the structures.*

### **Snow removal:**

It can be very expensive to remove the snow. You also have to have space for it. If the snow is light, there is not much danger of further collapse. If it is heavy, some growers found that as it settled, melted and refroze, it formed a cocoon next to the greenhouse and didn't add a lot of pressure. Removing it may cause more damage. If you need the light for the plants, then the snow will have to be removed.

Contact the insurance company.

Rent equipment to remove snow if necessary. Also rent to replace damaged heating/cooling equipment.

*-- John Bartok, Agricultural Engineer, Ashford CT – 11/24/14*

## **POTATO VIRUS Y: A RE-EMERGING DISEASE OF POTATO AND TOBACCO**

In recent years, growers have been reporting increased losses in potato and tobacco across the valley, the state, and the nation, due to Potato Virus Y (PVY). PVY is an aphid-transmitted virus that affects many crops in the solanaceous family including potato, tobacco, tomato, and pepper, as well as many solanaceous weeds. PVY can cause 50-80% yield losses in heavily infected potato fields, and also causes reduced storage quality, tuber necrosis and reduced sprouting. PVY has been present throughout the US for decades affecting mainly the seed potato industry, but has recently re-emerged as a major threat to potato and tobacco production for several reasons including the emergence of new strains of the virus that cause tobacco and tuber necrosis, widespread planting of potato varieties that show little or no PVY symptoms leading to undetected reservoirs of the pathogen in seed stocks, and climate change affecting the magnitude and timing of flights of aphid vectors.

### **PVY Strains & Symptoms:**

For decades the PVY strain that was present in the US and Canada, known as PVY<sup>o</sup> for ordinary, caused noticeable mosaic symptoms in most varieties. Symptoms of PVY<sup>o</sup> on potato and tobacco may include leaf streaking, mottling, or mosaic, or in severe cases could cause leaf death, leaf drop and plant stunting. In tobacco, vein-banding or vein-clearing is common. Symptoms on potato vary by cultivar, with some varieties showing only mild foliar symptoms while others,



*Potato plant with PVY<sup>O</sup> mosaic rugose symptoms*

especially Alturas, Dark Red Norland and Yukon Gold, are extremely susceptible and show rugose mosaic symptoms (wrinkly deformation of leaves). Since the PVY<sup>O</sup> strain caused noticeable symptoms on foliage, growers could rogue out infected plants visually, and levels of PVY in seed lots and crop damage and loss remained low. However, since the 1980s, new varieties of potato have been released which do not show typical stunting and mosaic symptoms, and may exhibit no symptoms at all, but still carry the virus. These “carriers” contribute to the undetected spread of the disease through fields and seed lots. Varieties that serve as PVY carriers include: CalWhite, Gem Russet, GemStar Russet, Russet Norkotah, Shepody, and Silverton Russet.

Furthermore, new strains of PVY have been making their way into the North American potato system which cause different symptoms, or no symptoms at all. PVY<sup>N</sup>, the N standing for necrotic (dead), caused a major problem for tobacco growers in the 1980s. PVY<sup>N</sup> induces severe necrosis on tobacco rendering it unmarketable, but only mild leaf mottle and necrosis on potato foliage, and therefore often went undetected in potato fields and seed lots. Although PVY<sup>N</sup> has all but disappeared in the U.S., new strains which contain genetic material from both PVY<sup>O</sup> and PVY<sup>N</sup> have emerged and become predominant in the U.S. potato production areas. These new strains, with some characteristics of both parents, are dubbed PVY<sup>N:O</sup> and PVY<sup>NTN</sup>. Both cause severe necrosis on tobacco foliage, mild foliar symptoms on most potato varieties, and they can cause necrotic flecking and rings on potato tubers of susceptible varieties such as Yukon Gold, Yukon Gem, and Waneta. Yellow flesh varieties tend to be more susceptible to tuber necrosis.

### **Disease Cycle:**

Infected seed tubers are by far the most important source of PVY. Seed tubers are certified by state departments of agriculture to ensure little to no viruses is present. “Foundation” seed is the best grade and should have less than 0.55% total virus (including viruses other than just PVY) while “certified” seed may have anywhere from 0.56-5.0% total virus. Investing in Foundation seed is the best way to keep PVY off your farm. Seed buyers should ask for the post-harvest test data to determine the true virus levels in seed and they should ask for strain identification if the seed does have low levels of PVY. It is important the potatoes grown in tobacco production areas be free of the PVY<sup>N:O</sup> or PVY<sup>NTN</sup> strains since these will cause severe leaf necrosis in tobacco. Once the virus is present in a field it is transmitted mechanically or is vectored by aphids. Mechanical transmission is inefficient in the field but can occur by movement of virus particles through plant sap via wounds caused by wind, workers, and equipment moving through the field.

Aphids are much more efficient at transmitting the virus and are considered the most important mode of disease spread. PVY is non-persistently transmitted, meaning that aphids can pick up virus particles on the tips of their mouthparts while probing or feeding in a matter of seconds and can spread the virus just as quickly to healthy plants—the virus does not have to move through the aphid vector at all as in persistently transmitted virus diseases. Since the virus is spread quickly through aphid probing, foliar applications of insecticides are not very useful in reducing spread of the virus by aphids, since some insecticides actually cause aphids to twitch and increase their probing activity. More than 50 species of aphids can spread PVY, including species which are not considered pests of potato or for which potato is not a preferred host. Systemic insecticides applied at planting are important to prevent the colonizing aphids, mainly the green peach aphid and potato aphid from developing on potato. Other aphids



*Yukon Gold with PVY<sup>O</sup>  
photo: [potatovirus.com](http://potatovirus.com)*



*Yukon Gold tubers with PVY<sup>NTN</sup> showing symptoms of potato tuber necrotic ringspot disease (PTNRD)  
photo: [potatovirus.com](http://potatovirus.com)*



*Tobacco with necrotic symptoms of PVY*

migrating from other crops, e.g. grains, soybeans, trees, and moving through potato in search of another host are likely responsible for the bulk of the virus spread.

Other solanaceous crops may harbor the disease without showing symptoms. This includes crops such as tomato and pepper as well as many weed hosts such as hairy nightshade. These asymptomatic carriers serve as reservoirs for PVY and contribute to undetected spread of the disease throughout the season, but luckily, true seed cannot be infested with PVY and so you don't need to worry about the virus surviving between crops in weed seed.

Transmission of viruses occurs most easily in young plants, and the virus can more easily move throughout the plant when it is young. Furthermore, if young plants are infected, the virus has more time to build-up within the plant and cause more severe symptoms or migrate to the tubers. Weather and other environmental conditions also influence the severity of PVY, and the expression of symptoms in different crops and cultivars.

## Management

**Use only certified disease free seed tubers.** For many years seed certification programs were highly successful in maintaining low levels of PVY in seed stock, but due to the presence of new strains that show mild or no symptoms, the widespread planting of symptomless “carrier” varieties, and changes in aphid populations, it has become harder to produce disease free seeds. Seed certification programs do post-season testing which reliably detect the virus and classify seed lots as “foundation” or “certified”, meaning they harbor less than 0.55% total virus, or 0.56-5.0% total virus, respectively. Here are some tips for ensuring your potato seed is clean:

- Ask for results from **post-season “winter” or “Florida” tests**. This data is now available and should be published online for each of the 17 states with certification programs (e.g. ME, NY, MI, WI etc.)
- Locate a promising lot of seed in the published book of results and ask the supplier the 3 questions below:
  1. Ask for the number of potatoes emerged or % emergence. The winter grow-outs are done on a lot of 400 tubers—if only 40 of them germinate then the effective size of the test is cut ten-fold.
  2. Ask for the percent of emerged tubers that tested positive for virus (“virus” effectively equals PVY, as 99% of virus on seed lots is PVY). Look for seed with no detectable virus. Do not plant seed with >2% virus!
  3. If the lot tested positive for virus, ask which strain was present—if the N or NTN strain is present don't purchase from that lot.

## Choose potato varieties carefully.

- Plant resistant varieties: Eva is the only truly resistant variety currently available. It is a round, white variety for fresh eating or for storage with good taste and appearance and is also resistant to golden nematode, common scab, early blight and hollow heart.
- Avoid planting symptomless varieties: CalWhite, Gem Russet, GemStar Russet, Russet Norkotah, Shepody, and Silverton Russet.
- Avoid planting highly susceptible varieties: Yukon Gold, Yukon Gem, Dark Red Norland and Waneta.

**Reduce areas of bare soil around or within the crop.** Aphids find plant tissue based on the color contrast between the foliage and the bare ground, so if there is no bare ground the aphid cannot “see” the crop.

**Plant a barrier crop.** Plant a border of non-host crop such as rye, sorghum, or wheat, several yards wide around your potato or tobacco planting. Migrating aphids will be more likely to land on the barrier, and when they probe the barrier crop to see if it is a suitable host their mouthparts will be effectively cleaned of virus particles. Remember not to leave any bare ground between the crop and the barrier.

**Control solanaceous weeds.** These include all of the nightshades which can be symptomless carriers of the virus, increasing disease severity and spread.

**Rogue out affected plants.** Infected plants will spread virus to their neighbors so walk the field and pull out any plants with signs of leaf mosaic or necrosis. Some of the new strains do not cause mosaic symptoms but some do, as does PVY<sup>o</sup>, and losses in yield and storability can occur from any PVY strains. Volunteer potato plants that pop up in spring should always be rogued out, as these could be infected with PVY or other diseases such as late blight. Learn to identify symptoms: [check out this picture gallery](#), which will be updated frequently with more symptoms on different cultivars.

**Aphid control.** Systemic insecticides applied at planting are very important to prevent the colonizing aphids, mainly the green peach aphid and potato aphid, from developing on potato. Controlling populations of colonizing and migratory aphids in-season with foliar-applied insecticides is often ineffective and is not considered a valuable control strategy. There is some evidence that newer behavior modifying pesticides may be of use, including: Assail, Belay, Admire Pro, Fulfill, Movento, and Platinum, but the jury is still out on these. Using horticultural oils to repel aphids may be helpful but sprays need to be started early and made regularly (twice per week) all through the season until after vine-kill when all foliage is completely dead.

**Plant early and kill vines early.** Aphid populations skyrocket in the late season, so planting early may allow you to get in more growth free of high densities of aphid feeding and potential disease spread. Growers may hesitate to kill vines too early because tuber size may be compromised, but if PVY is present, killing vines will prevent it from spreading to tubers causing total loss. Virus transmission from foliage to tuber takes 14-26 days depending on plant age and variety – it can move much faster in some. Again, if you are using horticultural oils for aphid control it is important to maintain oil sprays to end of season until green material is gone (i.e. after vine kill).

**If you have experienced PVY in your fields please get in touch with us so that we can begin to better document the extent of damage being caused in MA and so we can alert you to upcoming outreach events and workshops on PVY. Write us at [umassvegetable@umext.umass.edu](mailto:umassvegetable@umext.umass.edu) or call 413-577-3976.**

*--Susan B. Scheufele, UMass Extension with special thanks to Dr. Stewart Gray, Cornell University*

## **GROWER SURVEY ON SWEDE MIDGE**

**Swede midge**, *Contarinia nasturtii*, is slowly invading within the Northeastern US. It is an invasive insect pest in the Northeastern US that can cause devastating losses to Brassica crops (up to 100%). Given the staggering losses caused by the midge and its recent rise in damage, there is serious need to develop sustainable pest management strategies prior to the onset of major economic losses. Brassicas are a vital crop for Northeastern vegetable growers; New York is the top producer for fresh cabbage nationwide, and 2nd in processing cabbage (total value of \$62 million per year). The current major pest management recommendation, aside from long and widely-spaced rotations, is to use systemic neonicotinoids at planting, followed by weekly applications of neonicotinoids. Alternatives to chemicals pesticides have not been developed. The long-term goals of this project are to develop plant and systems-based pest control options to reduce swede midge infestation.

We are currently conducting a survey to determine: 1) how much existing knowledge growers have on effective pest management practices and 2) determine grower willingness to try alternative pest management practices.

We would appreciate if you could complete this online survey. It should only take about 5-8 minutes of your time.  
<https://survey.uvm.edu/index.php/224619/lang-en>

*-- Yolanda Chen, Assistant Professor, University of Vermont*

## **UPCOMING EVENTS**

**[New England Agricultural Marketing Conference & Trade Show](#)**

**When:** Wednesday, February 25 and Thursday, Feb 26, 2015

**Where:** Sturbridge Host Hotel, 366 Main St, Sturbridge, MA 01566



*Have you seen puckered leaf symptoms like this in your brassicas?  
photo: Christy Hoeping, Cornell, NY*

This is the 5th biennial New England conference and it draws hundreds of farmers and farm industry members to idea-laden workshops and to hear motivational speakers. The theme of the 2015 conference is Direct Marketing to Diversified Wholesale, Finding What Works. Attendees will experience nearly 30 workshops on topics such as retail and wholesale marketing, agri-tourism, business planning and more. An all day workshop for New England Farmers' Market Managers will be held on Wednesday, February 25th. Don't forget the trade show with a large variety of agricultural suppliers and vendors!

\*\*\*Early Bird registration until February 3. Click [here](#) or go to [www.harvestnewengland.org](http://www.harvestnewengland.org) for more information. Program details and lodging options are also available at this site. Register early for the best rate!

### [SEMAP Agriculture and Food Conference](#)

**When:** Sunday, March 1st, 2015 9:00 am to 4:30 pm

**Where:** Bristol Agricultural High School, Dighton, MA

Southeastern Massachusetts Agricultural Partnership and the Bristol County Conservation District present this conference with workshops for the general public as well as info-packed sessions for farmers and gardeners of all experience levels and workshops specific to organic methods. Registration includes a locally-sourced lunch prepared by *M&C Cafe of New Bedford* and at the *Resource Fair* you'll learn about local organizations and businesses that provide services and products to help you grow.

Presentations from UMass Extension Educators include:

- 2014 Vegetable Disease Update, *Susan Scheufele*
- Brassica Pest Management, *Susan Scheufele*
- Hot Water Seed Treatment, *Katie Campbell-Nelson*
- The Latest on On-Farm Food Safety, *Rich Bonanno*

### [Plant Nutrition and Organic Certification for Greenhouse Crops](#)

**When:** Thursday, February 26, 2015 from 10:00 am to 1:30 pm

**Where:** D&D Farms Inc., 32 Hudson Rd., Stow, MA 01775

Presented by UMass Extension, this half-day program will cover:

- Fertilizing Container Grown Crops with Water Soluble Fertilizers  
*Dr. Rosa Raudales, University of Connecticut*
- Growing Spring Crops Using Organic Fertilizers  
*Dr. Douglas Cox, UMass Extension*
- Organic Certification for Greenhouse Container Crops  
*Don Persons, Certification Administrator, Baystate Organic Certifier*

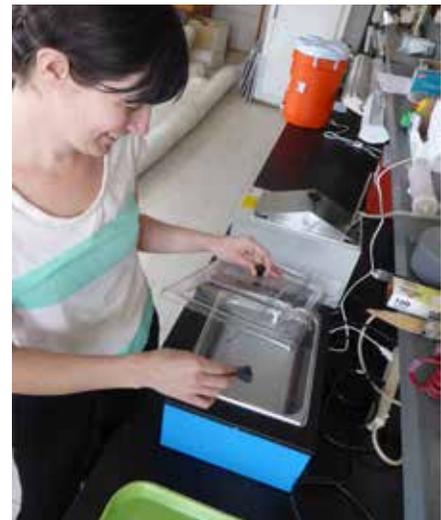
Mail-in Registration: [Printable Program and Registration Form](#), Cost: \$30 (Includes Lunch)

For more information contact:

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Bob Luczai, Massachusetts Flower Growers Association, [bluczai@massflowergrowers.com](mailto:bluczai@massflowergrowers.com)



*Lisa McKeag operates the hot water seed treatment equipment at the UMass Extension Vegetable Program lab.*

### [Advanced Farm Management](#)

**When:** Thursdays March 19, March 26, April 2, and April 9, 2015 from 11:00am to 3:00pm

**Where:** Brigham Hill Community Farm, North Grafton, MA

**Sponsor:** UNH Extension

This workshop is for mid-career producers who are serious about building their financial management and strategic marketing skills. Participants will evaluate their businesses' overall financial condition and examine the costs and profitability of individual enterprises. With a handle on production costs, participants will be able to assess their marketing plans and options, revise their product mix, and project next year's profits and cash flow. Each location is limited to 25 participants to facilitate in-depth learning. We encourage multiple people from a farm to attend together.

This workshop series is for those serious about acquiring new skills they can apply immediately in their own farm operations. Participants will need to commit to attending the four sessions, completing homework assignments between sessions, and applying what they learn to their farm operations. To get the most value from this workshop series, participants will need to have a Profit and Loss Statement and a Balance Sheet for their farm. In addition to the four classes, there will be a weekly webinar for people to gain clarity and help with concepts from the previous class.

To apply for this program, please fill out the short questionnaire located at: <http://tinyurl.com/nbh6nmk>

**Pre-registration cost:** Application and \$25 per farm

**Pre-registration Deadline:** Two weeks prior to start of session or until session fills (25 people).

### [UMass Extension Symposium: Pollinator Health for Agriculture and Landscapes](#)

**When:** Thursday, March 26, 2015 from 8:45 am to 4:00 pm

**Where:** Campus Center Auditorium, 1 Campus Center Way, Amherst, MA 01003

UMass will host experts from New England Extensions to cover the following important topics in pollinator health:

- Biology, Diversity and Conservation of Native Bees in the Northeast  
*Joan Milam, Department of Environmental Conservation, University of Massachusetts-Amherst*
- The Natural History and Ecology of Honey bees in Our Landscapes  
*Dr. Frank Drummond, School of Biology and Ecology, University of Maine*
- How Healthy are the Bees?  
*Dr. Frank Drummond, School of Biology and Ecology, University of Maine*
- Designing Pollinator Support Plantings: Think Like a Bee  
*Dr. Lois Berg Stack, University of Maine, Northern New England Pollinator Habitat Working Group*
- Neonicotinoids in Agriculture and Landscapes: Do They Harm Honey Bees or Native Bees?  
*Dr. Kim Stoner, The Connecticut Agricultural Experiment Station*
- Creating a Bee-friendly Landscape: Protecting Bees from Pesticide Exposure  
*Dr. Anne Averill, Department of Environmental Conservation, University of Massachusetts*

\*\*4 Pesticide Credits have been approved in all categories.

For more information about the program contact:

Tina Smith, Univ. of Mass, Amherst 413-545-5306, [tsmith@umext.umass.edu](mailto:tsmith@umext.umass.edu) or  
Ellen Weeks, Univ. of Mass, Amherst, 413-545-2685, [eweeks@umext.umass.edu](mailto:eweeks@umext.umass.edu)

Cost: \$65 for one, if two or more from same business, then \$40/person

Mail-in Registration: [Printable Program and Registration Form](#) or [Register On-Line](#) using a credit card.

*Vegetable Notes. Ruth Hazzard, Katie Campbell-Nelson, Lisa McKeag, Susan Scheufele, co-editors.*

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