



UMass  
Extension

# Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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## CROP CONDITIONS

We seem to be in a sweet spot between summer and fall where the crops are bountiful, work days are pleasantly cooler and insect pests are slowing down. Fall cabbage, broccoli, and cauliflower are coming in, along with loads of brassica greens. Potato and sweet potato harvests are underway, pumpkin and squash is being windrowed and binned up, and all the while tomatoes and peppers and eggplants and even zucchini and cucumbers continue to produce like mad, despite cooler and wetter weather! Many are fretting the balancing act of waiting for squash to fully ripen but wanting to get it all picked before it is consumed by myriad diseases or is eaten by coyotes and deer and woodchucks, oh my! Lots

of squash fields have been hammered by powdery mildew by now, but we were encouraged to see powdery mildew-resistant varieties holding up quite well on one farm we visited this week. Especially for small and mid-sized operations that aren't equipped to spray all their crops regularly, resistant varieties are an excellent disease management tool.

It's a lot to balance right now, with planting the last fall greens and starting to think about getting high tunnels turned over and planted for winter harvests as well, but it's also a rewarding time of year to see how much food you have been able to grow!

## PEST ALERTS

### **Brassicas:**

**Black rot** is a common disease in brassicas this time of year. (There is also a [black rot disease of cucurbits](#) that also develops in the fall—these are 2 completely different diseases.) It is common to see the characteristic V-shaped yellowing on leaves in fall plantings but smaller lesions across the leaves or stems may also be seen. This disease, caused by the bacterium *Xanthomonas campestris* pv. *campestris*, is commonly seed-borne and is usually introduced into fields on seed or infected transplants. The pathogen is spread by splashing water,

wind, equipment and tools, humans, and insects. Chemical control of black rot is largely not effective so using clean seed, preventing contamination from nearby infected brassica fields, and crop rotation are essential for managing this disease. Select seed that is certified disease-free, or hot water treat your seed. Click here for information on [UMass Extension's hot water seed treatment service](#). The bacteria will survive in soil on crop debris; rotate infested fields out of brassicas for 2 years. Don't work in fields when crops are wet, and work in clean fields before infested fields.

Summer generations of [cabbage root maggot](#) do not usually cause extensive damage to brassicas because hot soil temperatures kill eggs. Now that temperatures are dropping, we expect to see damage in fall root crops. We are past peak flight of the 4<sup>th</sup> CRM generation and should be seeing damage from the resulting maggots soon. If you are still seeding fast-growing root crops like radishes and turnips, keep them covered. For uncovered plantings, soil drenches can control this pest. Check for eggs at the base of 25 plants, in groups of 2-5 plants, randomly throughout the field.



*A common sight in winter squash this time of year: a heavy dusting of squash bug nymphs. Once winter squash is harvested, till under crop residues ASAP to kill the bugs before they leave the field for overwintering sites on field edges.*

*Photo: G. Higgins*

Apply a soil drench 2-3 days after eggs are first seen if >10% plants are infested. Labeled products are listed in the [New England Vegetable Management Guide](#).

**Caterpillars** continue to cause feeding damage and moths are still flying and laying eggs, so continue to scout your fall brassicas and treat at 35% infestation for young heading crops and 15% for leafy crops or headed crops.

**Flea beetles** are also still present in brassica fields. Lots of growers are wondering whether or not it's safe to remove row covers now. That decision depends on the damage level acceptable for each growers' markets, but the beetles are definitely still out there, munching away, especially on non-waxy brassicas like bok choy and mustards.

### Cucurbits:

**Squash vine borer:** Although many farms have stopped trapping, squash vine borer trap numbers increased from last week at 2 sites in NH and 1 in MA, indicating a partial second generation may be occurring. This generation of adults will lay eggs on winter squash fruit, and hatching larvae will bore into the fruit. We have seen damage from this generation in fruit on and off over the years, depending on environmental conditions that speed or slow insect development and timing of squash harvests. Look out for fruit with entrance holes and lots of frass; destroy any infested fruit that you may find to reduce the size of the overwintering population of this pest. Tilling under crop residue deeply will help reduce the survival of the overwintering population.

**Phytophthora capsici** was confirmed causing fruit rot on winter squash on one farm in Worcester Co., MA last week—not surprising given the more regular rainfall we've had over the last few weeks. This disease cannot be managed using fungicides alone. Plant peppers and cucurbits into clean fields and prevent movement of inoculum into uninfested fields on tractors, implements, and in water. For the most current fungicide recommendations, see [Fungicides for Managing Phytophthora Blight in Cucurbits and Other Vegetables](#) from Meg McGrath of Cornell University.

### Solanaceous:

**Late blight** is continuing to spread around New York and Pennsylvania. With winds from Hurricane Dorian, it's possible that it will spread further in the next week, so be sure to get preventative sprays on this week.

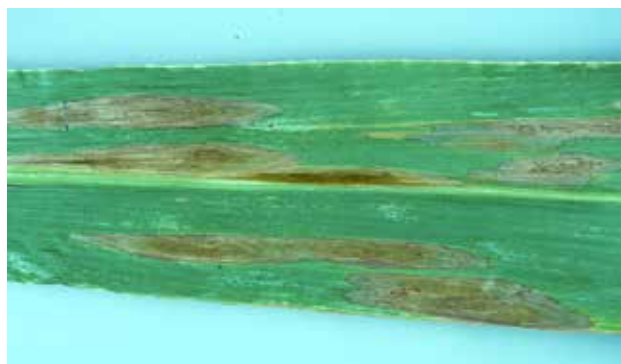
Take note of whether you're seeing extensive **Verticillium wilt** in your eggplant this year so that you can plan to move next year's eggplant to a new location. Often times, this disease will cause part of a plant to wilt, or half of a leaf to wilt. This fungal pathogen can survive in the soil without crop residue and has a very wide host range. It can infect other solanaceous crops, but is most damaging to eggplant and okra. Crop rotation to reduce soil inoculum levels is difficult because of the wide host range, but moving eggplant to a non-infested field will at least protect the most susceptible crop.

### Sweet Corn:

**Northern corn leaf blight:** We have heard reports throughout New England of NCLB over the last week. From the [New England Vegetable Management Guide](#): "Northern corn leaf blight [caused by the fungal pathogen *Exserohilum turcicum*] is an emerging problem on farms up and down the Connecticut River Valley. NCLB can develop very rapidly resulting in a complete blighting of leaves. *E. turcicum* overwinters in and on leaf debris and conidia can be spread long distances by wind. Under the right conditions (prolonged leaf wetness, extended rainy and humid weather, moderate temperatures), conidia are produced abundantly and disease spread is rapid. Reduce primary inoculum by crop rotation and tilling under of crop residue. Evidence suggests more severe disease in reduced-till systems; 1-year rotations are suggested for conventional practices and 2-year



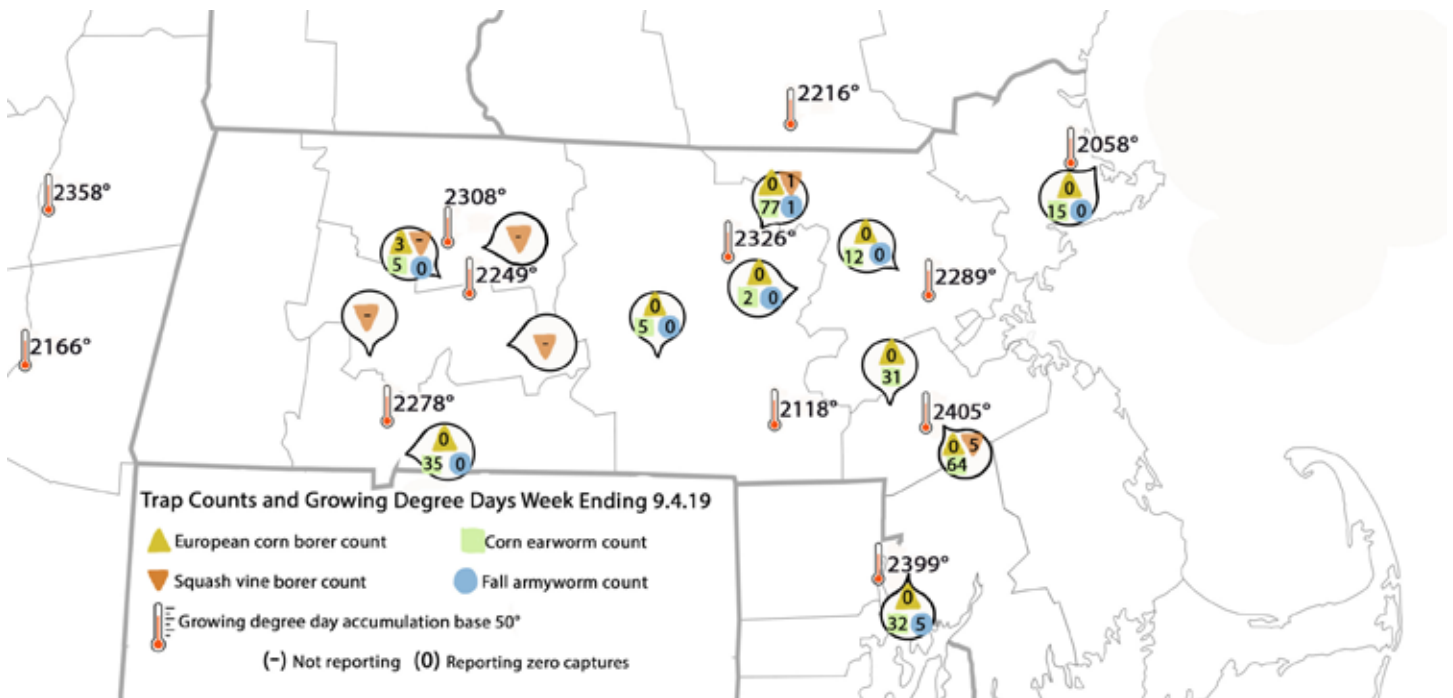
*Verticillium wilt on eggplant.*  
Photo: UMass Extension Vegetable Program



*Northern corn leaf blight lesions.* Photo: R.L. Wick



rotations for reduced-till. Resistant hybrids of all maturity groups are available. Lesions may vary in morphology when certain genes for resistance to this disease are present. The presence of these genes results in long, yellow, linear streaks that resemble the symptoms of [Stewart's wilt](#). Growing susceptible varieties will cause the resistance of nearby resistant varieties to break down. Fungicide rotation is critical for prevention of resistance development—do not make back-to-back applications of products with active ingredients from the same group.” See the link to the NE Veg Mgmt Guide above for labeled materials.

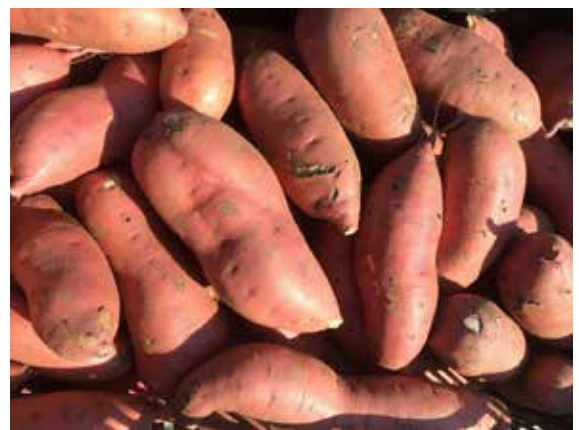


[Corn earworm](#) numbers have dropped from last week, with some sites down to a 5-day spray schedule. Other sites remain on a 4-day spray schedule. We’ll see what the winds from Hurricane Dorian push up the coast—we could see another surge of moths next week from that. Most sites are reporting no [fall armyworm](#) and [European corn borer](#) captures this week, though like CEW, more FAW could be pushed up the coast this coming week from Hurricane Dorian. The ECB flight seems to be over in most locations now. Continuing to control for CEW in late season corn will clean FAW and ECB up as well.

Spray Intervals for corn earworm based on moth captures in Heliopsis net traps.		
Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	no spray
0.2 - 0.5	1.4 - 3.5	6 days
0.5 - 1	3.5 - 7	5 days
1 - 13	7 - 91	4 days
Over 13	Over 91	3 days

## SWEET POTATO HARVEST & STORAGE

Labor Day has passed, temperatures are dropping, and some growers have started harvesting sweet potatoes—must be almost fall. Sweet potatoes can be harvested whenever they reach a marketable size, but if you are looking to maximize yields, they should be dug as late as possible in the fall, according to research done by Becky Sideman at UNH Extension. While vines can tolerate a light frost, the roots should come out before a hard freeze sets in. For more information on Becky’s research, including a list of varieties trialed in New Hampshire, see the full reports: [Growing Sweet Potatoes in New Hampshire](#) and [Sweet potato early harvest study, 2014](#). The storage needs of sweet potato differ from other common New England root crops. Once harvest is completed—generally by early to mid-October—curing and storage considerations continue to be important.



*Sweet potato harvest has begun!  
Photo: R. Santizo*

**Harvesting.** Sweet potato roots continue to grow until the leaves are killed by frost or until soil temperatures fall consistently below 65°F, whichever comes first. Check current soil temperatures here: <http://newa.cornell.edu/index.php?page=soil-temperature-map>. Timing of harvest is often determined by digging up a few representative plants and assessing the percentage of roots in different size classes—the crop can be harvested whenever the majority of the roots are the desired size. If a hard frost occurs, the tops of the plants turn black. At that point, it is imperative to harvest as quickly as possible regardless of root size. Chilling injury can occur if soil temperatures drop to 55°F or below. It is also important to avoid holding sweet potatoes in saturated, low-oxygen soil conditions prior to harvest, as this promotes rapid decay in storage. Take care when harvesting. Unlike tubers such as white potatoes, which form thickened, protective skins that bind tightly to the underlying tissue, sweet potatoes have thin skins that can be easily damaged by equipment or rough handling.

**Curing.** Any abrasions or wounds created at harvest can lead to rot in storage. Curing immediately after harvest is recommended when sweet potatoes will be held in storage for later sales. Curing minimizes damage and loss during storage by healing harvest wounds. During the curing process, a corky periderm layer is formed below damaged areas, which prevents invasion by pathogens and limits water loss. To cure sweet potatoes, keep roots at 82-86°F and high relative humidity (90-97% RH) for 4-7 days. Respiration rate is high during curing, so ventilation is important to remove CO<sub>2</sub> and replenish O<sub>2</sub>. A greenhouse can provide good curing conditions.

A freshly harvested sweet potato is more starchy than it is sweet. During curing and storage, starches in the sweet potato are converted to sugars, improving flavor. The change in sugars is measurable within one week, but it is recommended to wait at least three weeks after harvest before consuming sweet potatoes to allow for more conversion of starches to sugars and maximum eating quality.

**Storage.** Sweet potatoes can maintain excellent quality for up to a year if proper storage conditions are achieved. The ideal storage conditions for sweet potato are the same as for winter squash; moderately warm (55-60°F) and 60-75% relative humidity. Like winter squash, sweet potato suffers chilling injury at temperatures below 55°F and injury increases with lower temperatures or longer periods of exposure. Signs of chilling injury include shriveled, sunken, dark areas on the tuber surface, and blackening of tubers when cut open. ‘Hardcore’ is a physiological disorder caused by chilling, in which areas of the tuber become hard—the condition is not apparent in fresh roots but appears after cooking. Because chilling injury is irreversible and makes tubers unmarketable, growers should take particular care to avoid field curing, or storage conditions that dip below 55°F.

--Written by R. Hazzard and updated for 2019 by L. McKeag

## **CULLING GARLIC: DON'T PLANT OR STORE INFECTED BULBS**

There are several opportunities to inspect garlic cloves for symptoms of nematode and disease infection. Whether you cull as you harvest, as you put them in the barn or greenhouse to cure, or now as you cut and sort them for seed or storage, I encourage you to take a careful look at some point to avoid disease spreading through a storage crop or contaminating another field or next year's crop by planting infected bulbs this fall. Most disease symptoms we see on garlic bulbs or cloves result from infections that occurred in the field, so identifying them now will tell you which fields to avoid planting garlic into in years ahead, as most of these pathogens persist for many years in the soil. Below are listed the symptoms of the most common pests and diseases that will affect garlic seed and storage crops.

**Bulb mites** (*Aceria tulipae* and *Rhizoglyphus* spp.): Garlic seed infested with bulb mites may fail to germinate. Plants grown from infested seed may lack vigor and produce stunted, deformed leaves. Plants may outgrow the damage if the infestation is not heavy, but mites may increase in number over the growing season and will remain in the harvested garlic.



Damage from bulb mites. Photo: E. Sideman



*Rhizoglyphus* bulb mite at 10x magnification.  
Photo: A. Madeiras

Viral symptoms may be seen. In the field, mites feed mainly on the roots and basal plate. In storage, the mites move into the garlic bulb, where their feeding activity causes sunken tan to brown spots to form on cloves. Desiccation may occur, and secondary pathogens like soft rot bacteria or fungi may also invade. Bulb mites can overwinter in the soil, especially in soils with high levels of decaying organic matter, and can survive on the residues of a number of crops. Only plant into fields where crop residue is thoroughly decomposed. **Avoid planting alliums directly after brassicas, corn, grain, or grass cover crops.**

**Stem and bulb nematode** (*Ditylenchus dipsaci*) damage can be mistaken for Fusarium basal plate rot, with bulb decay occurring both at the neck and the basal plate of the bulbs. The bulb tissue begins softening at the neck and gradually proceeds downward; the scales appear pale gray to dark brown, and the bulbs become shrunken, soft, and light in weight. Under moist conditions, secondary invaders such as bacteria, fungi, and onion maggots induce soft rot and decay of the bulbs. Affected bulbs may still be sold as food, but be clear with customers that garlic infested with stem and bulb nematode should not be planted; this is how it gets introduced to new fields and once present it cannot be eradicated.

**Downy mildew** (*Peronospora destructor*): Affected bulbs may be smaller and shriveled, with a blackened neck, and outer scales will become water-soaked. Some bulbs may sprout prematurely.

**White rot** (*Sclerotium cepivorum*) causes white fluffy growth around the stem plate and bulb and small sclerotia—hardy resting structures that allow the pathogen to persist for years—about the size of poppy seeds form on the bulb, often around the neck. This disease will continue to grow and spread in storage if humidity is not kept low.

**Fusarium basal rot** (*Fusarium oxysporum* f. sp. *cepae*) causes red to purple discoloration of bulb exterior and sometimes a white fluffy mycelial growth at the base may be observed. If the bulb is cut open, one or several cloves may appear brown and watery. Later, the stem plate becomes pitted and a dry rot develops. The disease continues to develop in storage.

**Botrytis neck and bulb rot** (*Botrytis porri* and *B. allii*, respectively) infections start in the fields but symptoms usually do not develop until the bulbs have been moved into storage—a good reason to check your curing garlic periodically! Affected neck or bulb tissue is initially water soaked, but later turns dry and necrotic. Sclerotia—those hardy black resting structures—form in the neck or adhere to the rotten outer scales of the bulb.

**Penicillium decay** (*Penicillium* spp.) is a major cause of decay of bulbs in storage and can spread to healthy bulbs via airborne spores. The fungus causes fuzzy, blue-green growth on diseased cloves, usually starting at the base.

#### Disease Prevention Tips for Harvest and Storage

- Do not irrigate within 10 to 14 days of lifting. Avoid harvest after heavy rains.



*Stem and bulb nematode.*  
Photo: B. Watts UMaine.



*Fusarium basal rot.* Photo: Oregon State Univ.



*Botrytis bulb rot with sclerotia present.*  
Photo: Oregon State Univ.



*Penicillium decay.* Photo: Oregon State Univ.



- Avoid mechanical injury and bruising of bulbs during production and harvest. Avoid banging cloves together to remove mud and dirt from roots.
- Properly cure bulbs. Cure in a well-ventilated area at 70-80°F. Practices that hasten curing include undercutting bulbs to sever all roots, avoiding nitrogen fertilization later than two months after seeding, and proper plant spacing. Under wet conditions when bulbs cannot be cured adequately, artificial drying with forced hot air followed by normal storage should be considered.
- For long-term storage, garlic is best maintained at temperatures of 30 to 32°F with low RH (60 to 70%). Good airflow throughout the vented bins or other storage containers is necessary to prevent any moisture accumulation. Under these conditions garlic can be stored for more than 9 months.

*--Written by Susan B. Scheufele*

## **EVENTS**

### **ATTORNEY GENERAL MEETING ON OVERTIME RULING**

**When:** Friday, September 13, 2019, 1:00pm

**Where:** Nourse Farms in Whately

Farmers are invited to a meeting with State Representative Natalie Blais, The Secretary of Labor and Workforce Development's office, and the Attorney General's office to discuss the implications of the recent Chang Farm ruling by the Massachusetts Supreme Judicial Court (SJC).

In March, the SJC ruled that workers involved in on-farm "preparation for market" activities are not exempt from overtime pay while doing tasks that are considered "preparation for market". It had been the understanding for many years that market preparation was exempt from overtime requirements.

This ruling has had significant implications for many farms across the Commonwealth. The Attorney General's office is responsible for enforcing these policies. At the request of State Representative Natalie Blais, staff has agreed to meet with local farmers to give an overview of overtime rules and regulations and will do their best to answer questions to help you to understand the application of the ruling. The Attorney General's office will do their best to answer questions and provide clarification on the grey areas that exist in regards to what constitutes "preparation for market" activities versus other farm tasks which are covered by the overtime exemption.

Please note that the purpose of this meeting is not to discuss or argue the merits or logic of the SJC ruling as the ruling is beyond the control of these offices. Rather, this meeting is intended to help you gain a clearer understanding of the implications of the ruling and how it will be enforced.

**If you would like to attend please RSVP by September 9th, 2019 to [lily.wallace@mahouse.gov](mailto:lily.wallace@mahouse.gov)**

Any questions, please contact Brad Mitchell, MA Farm Bureau, at (508) 481-4766.

### **NORTHEAST MECHANICAL WEED CONTROL EXPO**

**When:** Thursday, September 12, 2019

**Where:** University of Maine Rogers Research Farm, 914 Bennoch Rd. (Rt. 16), Old Town, ME

**REGISTRATION:** [Click here to register for this event online.](#) \$20 on or before September 5. \$30 from September 6-11. \$40 on day of event. Pre-registration required. Registration is limited, so register early to assure a spot. No refunds can be offered for registrations made by check OR after September 5, 2019.

The Northeast Mechanical Weed Control Expo will feature tool demonstrations and research results for both vegetable and grain production. Hand-tools, walk-behind tractors/tool carriers, and tractor-mounted equipment will be on display and demonstrated in the field, and will include equipment from Terrateck® and Johnny's Selected Seeds, HAK®, Tilmor®, K.U.L.T.-Kress®, Garford®, Treffler® Harrows, and Franklin Robotics. We invite farmers of all levels of experience and production to participate. The day will include:

Research presentations and posters

Field demonstrations of tools for small-, mid- and large-scale growers

Friendly competition testing your weed knowledge and cultivation skills!

Plenty of time to connect with fellow growers, researchers, and industry representatives

*The Northeast Mechanical Weed Control Expo is supported by grants from the USDA-NIFA Organic Agriculture Research and Extension Initiative (OREI) and the Northeastern IPM Center.*

### ACIDIFIED CANNED FOODS WORKSHOP & WEBINARS

Producing shelf-stable acidified canned foods can help to add value to produce and help to increase markets, extend the agricultural season, and reduce waste. However, in order to successfully sell and distribute shelf-stable products, such as salsas, sauces, and/or acidified pickled products, processors must comply with the Code of Federal Regulations (21CFR114). This project identified and developed 12 shelf-stable acidified canned food recipes and converted them into scale-appropriate product formulations, established the appropriate food safety controls, and had all the product formulas reviewed by a regulatory approved Process Authority to issue a validated scheduled process for commercial use. These programs will include the overall product development process, review the product formulation manual, discuss some of the product development challenges that occurred during development, and discuss how processors can request access to these product formulations for their own market use to produce at their own commercial facilities.

#### **3-Hour Workshop:**

**When:** Tuesday, September 24, 2019, 5:30-8:30pm

**Where:** UMass Food Science Pilot Plant, 102 Holdsworth Way, Amherst, MA 01003

**Registration:** Register by Friday, September 20 at 5pm. [Click here to register for the workshop.](#) There is a \$20 program deposit fee, which will be reimbursed after the completion of the program.

#### **1-Hour Webinar:**

**When:** Wednesday, September 25, 2019, 12:30-1:30pm OR Thursday, September 26, 2019, 6-7pm

**Registration:** [Click here to register for one of the webinar times.](#)

Questions? Contact Teddy Phan at [tphan@umass.edu](mailto:tphan@umass.edu)

*This program is supported by the University of Massachusetts, the Massachusetts Department of Agriculture through the USDA Specialty Crop Block Grant, the Franklin County Community Development Corporations' Food Processing Center, Commonwealth Kitchen, and the Northeast Center to Advance Food Safety (NECAFS)*

### FSPCA PREVENTIVE CONTROLS FOR HUMAN FOOD CERTIFICATION TRAINING - BLENDED COURSE

**When:** Monday, October 7, 2019, 8am-5pm

**Where:** UMass Life Sciences Laboratories, Rooms S320 and S330, 240 Thatcher Way, Amherst, MA 01003

**REGISTRATION:** [Click here to register for this workshop.](#) \$119 per person. Registration deadline Monday, September 30. For more details see the event website, linked to above.

The Current Good Manufacturing Practice, Hazard Analysis, and Risk-based Preventive Controls for Human Food FDA regulation is intended to ensure safe manufacturing/processing, packing and holding of food products for human consumption in the United States. The regulation requires that certain activities must be completed by a “preventive controls qualified individual” who has “successfully completed training in the development and application of risk-based preventive controls.” This course developed by the FSPCA is the “standardized curriculum” recognized by FDA; successfully completing this course is one way to meet the requirements for a “preventive controls qualified individual.” To complete the course, a participant must be present for the entire workshop and actively participate in all of the presented exercises.

Upon completion of this course, the trainee will become a FDA-recognized “Preventive Controls Qualified Individual” (PCQI). The course covers:

- How to create a Food Safety Plan meeting the FDA requirements as required by the Food Safety Modernization Act

(FSMA).

- How to conduct a Hazard Analysis, and differentiate between prerequisite programs and risk-based preventive controls.
- Guidelines for choosing Critical Limits, setting up monitoring programs, and implementing corrective actions when deviations occur.
- Documentation for all aspects of the PCHF-required Food Safety Plan including verification and validation activities, monitoring, corrective actions, and records review.

For additional important program information, visit the event website, [here](#).

Questions? Contact Chris Von Achen, [cvonachen@umass.edu](mailto:cvonachen@umass.edu).

### [VERMONT VEGETABLE & BERRY GROWERS ASSOCIATION ON-FARM 2019 WORKSHOP SERIES](#)

The Vermont Vegetable & Berry Growers Association is holding a series of nine on-farm workshops from June through November this year. For more information on all workshops in this series, please click the linked event title above.

Attendance at these events is free for members of the Vermont Vegetable & Berry Growers Association. The cost is \$10 per-person for non-members, payable on-site. Refreshments will be served. Membership in the VVBGA costs \$55 per farm, per calendar year. The VVBGA works with University of Vermont Extension to deliver education and applied research for its growers.

**Wednesday, September 25, 3-6 pm.** Mighty Food Farm, 280 Rod and Gun Club Rd., Shaftsbury, VT 05262. Lisa MacDougall grows vegetables, berries and cover crops on 20 acres of hillside land and in five high tunnels for CSA and wholesale markets. She will host a tour of her new wash/pack facility with Chris Callahan and Andy Chamberlain on hand to discuss design considerations. Vern Grubinger and Becky Maden will assist with discussion of fall cover crops, nutrient management, erosion control, and high tunnel vegetable production.

**Questions?** Contact Vern Grubinger, 802-257-7967 x303. To request a disability-related accommodation, contact Dana Rupert, 802-257-7967, three weeks prior to an event so we may assist you.



## THANK YOU TO OUR SPONSORS:



*Vegetable Notes. Genevieve Higgins, Lisa McKeag, Susan Scheufele, co-editors.*

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