



UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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*Harrison Bardwell of Bardwell Farm collecting an irrigation water sample for E. coli testing.
Photo L. McKeag*

CROP CONDITIONS

Growers rushed to cover crops ahead of Wednesday night’s frost, when it dipped down to 26-30°F for a few hours in most parts of the state. Vern Grubinger of UVM Extension shared good tips for assessing frost injury in vegetable crops: “Continue to care for relatively healthy plants with adequate irrigation, fertilization, pruning, pest monitoring and control. Even if perennial fruits are not going to produce a crop this year, you are now caring for [the] ability to produce future crops. Note that injured tissues may be sites for fungal infections to get going, so be ready to protect healthy tissue on crops with fungicides—organic or conventional—if needed, especially if weather turns wet. If the growing point of an annual vegetable crop has not been damaged, the crop should recover with some TLC. However, if there is severe damage i.e. most leaves are toast, it may be better to replace rather than hope for recovery. (Full extent of injury may take a few days to show up on some crops.) With the growing degree day accumulation ahead of us replanted crops should catch up fast.” See the footnote on this page for links to photos of frost injury on different crops, also compiled by Vern.

Despite this week’s colder weather, the warm (hot, even) days back in April mean that growers were able to get into fields early and get plants in the ground, and the heat has pushed forward plants (and pests), especially in protected areas like unheated tunnels. Growing degree day (GDD) accumulation reflects that we had a warmer-than-usual April, although GDDs are not far off from the last few years when we look at accumulation since January 1.

It has been several weeks of dry weather, and we saw a lot of irrigation pumps in action this week. We’re still waiting for a final decision from FDA about whether any *E. coli* testing of pre-harvest water will specifically be required under the FSMA Produce Safety Rule. That said, it’s still a good idea to do some water testing now at the start of the season to get a snapshot of the quality of your water sources. If you participate in MDAR’s Commonwealth Quality Program, you are currently required to do some testing—3 times a year per surface water source and 2 times per well. You can look for a lab near you with this [map of water testing labs](#) maintained by the Northeast Center to Advance Food Safety (NECAFS). Also, the UMass Veg Program is currently working on a project to help growers assess their irrigation water quality, including helping with testing. Reach out to Lisa McKeag at lmckeag@umass.edu or 413-658-8631 for more information.

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Frost Injury Resources: [Assessing frost and freeze damage to flowers and buds of fruit trees](#) (Michigan State Univ. Extension) · [Spring freeze injury to blueberry flowers and fruit](#) (Michigan State Univ. Extension) · [Frost injury to strawberry flowers](#) (Cornell Univ.) · [Chilling injury on tomato foliage](#) (Univ. Maryland) · [Cold injury on tomato foliage](#) (Insect Images project) · [Chilling/frost injury on cucurbits](#) (Texas A&M Univ.) · [Cold injury images on various crops](#) (Rutgers Univ.) · [Frost damage on young corn](#) (Univ. of Kentucky) and [Purdue Univ.](#)

CONTACT US:

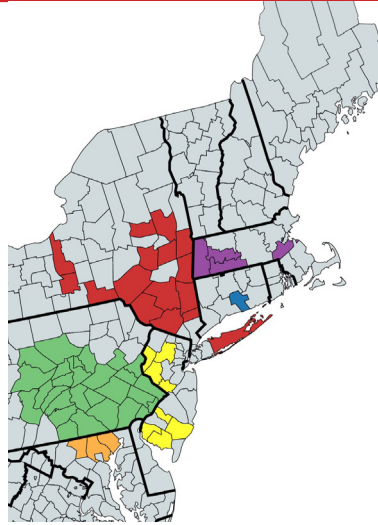
Contact the UMass Extension Vegetable Program with your farm-related questions, any time of the year. We always do our best to respond to all inquiries. **Office phone:** (413) 577-3976 **Email:** umassveg@umass.edu

Home Gardeners: Please contact the UMass GreenInfo Help Line with home gardening and homesteading questions, at greeninfo@umext.umass.edu.

PEST ALERTS

Alliums

Allium leafminer maggots continue to mine within infested plants. Once maggots are within the plant, they're protected from contact pesticide applications. Materials with translaminar or systemic activity are effective against larvae. These include dinotefuran (e.g., Scorpion or Venom), cyantraniliprole (e.g., Exirel), spinetoram (e.g., Radiant) and spinosad (e.g., Entrust). We have confirmed the presence of ALM in Berkshire, Hampshire, Hampden, and Norfolk Cos. The pest is likely present in several other counties in MA – if you see signs of ALM in another MA county, send us a picture at umassveg@umass.edu so that we can confirm it and update our distribution map!



Confirmed distribution of Allium Leafminer in the Northeast. Figure: R. Harding, Cornell



Allium leafminer oviposition scars on chives. Photo: Maggie Ng

Onion maggot: Most locations in MA are at peak flight for onion maggot except for the Berkshires, which are projected to reach peak flight late next week. This means that this is the period of peak egg-laying in uncovered allium crops. There are contact pesticides labelled to target adult onion maggot flies, but no products targeting the maggots. Crop rotation out of infected fields and using row cover to protect plants before flight begins are therefore important management tools.

Brassicac

Flea beetles are actively feeding in brassica crops now. Flea beetles overwinter in field edges and colonize crops in the spring. Eggs are laid in the soil and larvae feed on host roots but rarely do noticeable damage. Feeding damage from adults starts as tiny holes that expand with the leaves. There are many overlapping generations per year, so once flea beetles are out, they basically need to be managed nonstop throughout the season. See the article in this issue for management recommendations.

Cabbage maggot peak flight is over throughout the state and larvae are now feeding on brassica roots or pupating in the soil in warmer locations. The next generation of adult flies will emerge mid-summer; the summer generation rarely does significant damage because mid-summer soil temperatures are usually high enough to kill most eggs and larvae. It's too late to get any significant control of the larvae present now with pesticides—most materials are labeled for use at planting/transplanting or shortly afterward. Take note of infested fields and rotate fall brassica plantings as far away as possible.

Chenopods

Leafminers are active now and damage to leaves has been reported in parts of southern MA. Flies emerge from overwintering sites around this time, mate, and lay eggs on the undersides of beet, Swiss chard, and spinach leaves. When the eggs hatch larvae will tunnel into leaves where they will be protected from contact insecticides, so control with pesticides depends on either spraying as soon as egg hatch begins or using translaminar or systemic insecticides. See the article in this issue for more information.

Sweet corn

Pheromone traps for sweet corn caterpillar pests ([European corn borer](#), [corn earworm](#), and [fall armyworm](#)) are starting to go up this week in MA. European corn borer will start to emerge 374 GDD base 50°F, which will be in another week or two. Find current GDDs for various locations using the NEWA degree day calculator, [here](#). Select the nearest weather station to you, enter 1/1/23 as the start date and today's date as the end date, and select 'Base 50°F' under *Degree Day Type*.

Multiple crops

[Seedcorn maggots](#) continue to cause damage across the state. This pest usually feeds on the seeds of large-seeded crops (beans, cucurbits, corn, peas), and on young transplants of other crops. We also saw extensive damage caused by seedcorn maggots feeding on transplanted onions in multiple locations this spring. As with the other maggot pests, preventative measures including rotating out of infested fields and covering plantings with row cover before flights begin are key. For chemical control recommendations, see the appropriate crop section of the New England Vegetable Management Guide: [pumpkins, squash, and gourds](#), [cucumbers, muskmelons, and watermelon](#), [peas](#), [sweet corn](#), [beans](#).



Black cutworm larva in the tell-tale "C" shape

Cutworm damage is being reported now in New England. Cutworm damage can be mysterious because the caterpillars hide in the soil during the day and come out to feed at night. They will often cut off a transplant at the soil line and pull the whole plant underground to eat but will also chew large holes in leaves of larger plants. Digging up a large handful of soil around a cut-off plant will often reveal a large caterpillar curled in a tight "C"-shape. If controlling with pesticides, applying at nighttime when caterpillars are feeding will be most effective. For chemical control recommendations, see the appropriate [crop section of the New England Vegetable Management Guide](#).

TOMATO SEEDS AND PLANTS POTENTIALLY CONTAMINATED WITH VIRUS OF CON-CERN

--Written by Meg McGrath, with input from Margery Daughtrey, Margaret Kelly, Marc Fuchs, Karen Snover-Clift and Elizabeth Lamb, Cornell. Originally published in Cornell Veg Edge, Volume 19, Issue 7, May 17, 2023. Resources adapted for MA growers.

Tomato brown rugose fruit virus (ToBRFV) has been found this spring on seed of two tomato varieties, **Sweet Prince and Brandywise**, being sold to growers and gardeners. This emerging virus (first detected in the US in 2018) is **considered more serious than other viruses** because of the ease of spread when handling infected plants, the virus' long-term survival ability, and damage to fruiting plants.

Recommendations

- If you are notified by a seed company regarding infected ToBRFV seed or see announcements about seed you purchased, the seed and any plants grown from them **must be destroyed** NOT composted, surface buried, or thrown in a cull pile.
- **The infected lots reported were plants from Sweet Prince Lot #s NN21-SL-SP and NN22-SLSP2 and Brandywise Lot #s NS 10-II-br.**
- There are no treatments/sprays that will cure plants of ToBRFV or any other plant virus.
- **This virus can survive in soil for years**, thus there is potential for re-occurrence in future years in addition to potential for spread to other tomato and pepper plants with handling.
- Follow **strict sanitation practices** if you have infected plants, to include disposal or sterilization of all clothing, tools,

trays, pots, hoses, benches, etc. Clean surfaces where plants have been with diluted bleach (an example of an appropriate solution is 8.2 fluid ounces of an 8.25% bleach made up to 1 gallon of solution – check whether the concentration listed on the label of the bleach you have is 8.25% and adjust if necessary).

- Handling infected seed is **not** known to allow seed-to-seed transmission of ToBRFV because the virus resides inside the seed, not on the seed surface.
- **Handling infected plants** followed by handling healthy plants **is a transmission method.**
- Minimize touching plants with hands, clothing, and tools. Brushing plants to obtain sturdier stems is a dangerous practice because it may move viruses like ToBRFV, as well as bacterial pathogens. Watering seedlings is not considered to have enough force to transfer ToBRFV.
- When plants are handled, such as during transplanting, use hand sanitizer on gloved hands between plants when there is concern ToBRFV might be present.
- Check plants for symptoms at least once a week. Symptoms include mosaic and mottle, yellowing, bubbling in the leaf blade, and a ‘fern leaf’ look. If suspicious symptoms are seen, photograph and submit a sample to your local plant clinic (see below). Symptoms will likely start to appear by about 4-6 weeks after seeding, but some varieties remain free from symptoms even though infected.

See this American Seed Trade Association resource for pictures of symptoms of ToBRFV: <https://www.betterseed.org/wp-content/uploads/ToBRFV-QA.pdf>

For more information on ToBRFV:

[UMass Extension Greenhouse Crops & Floriculture Program ToBRFV Fact Sheet](#)

[USDA APHIS ToBRFV Frequently Asked Questions](#)

Testing

Massachusetts samples can be submitted for testing to the [UMass Plant Diagnostic Clinic](#).

PEST SCOUTING AND USING THE UMASS SCOUTING SHEETS

What is scouting and why is it useful? Scouting is the process of routinely checking crops for pests and disease to inform management decisions. The way to do this is to regularly check a random sample of plants across a field to get a sense of what pests are present and in what quantities, how widespread the problem is, and to identify any patterns in distribution, so that you can decide whether or not it’s time to implement a control strategy. It’s often a good idea to get into the field and see for yourself what’s happening when a pest has been detected on or near your farm, or when monitoring data or environmental conditions indicate that a particular pest may be emerging. Successfully implementing IPM requires that you are aware of the conditions on and around your farm each year and over time. Furthermore, establishing a scouting program can help you keep track of what you see and allow you to detect pest problems early and prevent and manage issues before they cause economic losses. Regular scouting will also help you determine whether your spray program and other control strategies are effective, as you can see pest numbers going up or down over time. The UMass Vegetable Program has developed a series of crop-specific scouting sheets, linked on the next page, to help you keep track of your scouting and make decisions about what you find.

Some things to consider before you go into the field:

Field history. What crop or crop family was planted here last year and what pest issues occurred? Consider insect pests, but also diseases that might persist in soil or on crop residues, and weeds. Also note locations of field edges, as pests may emerge from windrows, woods, or adjacent fields. Note shaded areas or places with poor drainage where diseases may begin to develop.

Pest identification. Know what you’re looking for! It’s important to be able to identify some of the key insects that may be feeding on your crop and to be able to tell the good bugs from the bad. You should also be able to recognize some of the signs and symptoms of insect feeding, and common diseases and physiological disorders. There are lots of great ID guides out there, including the [Northeast Vegetable & Strawberry Pest Identification Guide](#)—a collaborative effort of the New England Extensions. It can be very tricky to identify problems in the field, though, so if you

find something suspect, you can contact us for help or consider having it diagnosed at the [UMass Plant Diagnostic Lab](#), or testing soil or plant tissues for nutrients at the [UMass Soil and Plant Tissue Testing Lab](#).

Pest life cycles. Consider when certain pests are active and if they overwinter or persist in the environment, or if they have to travel from warmer locations on storm fronts. Pheromone traps, sticky cards, keeping track of growing degree days (GDDs), and using web-based monitoring tools can all help with knowing when to keep an eye out for particular insects and/or diseases. It's also important to know what the different life stages of insect pests look like, where you might find them, and which stage(s) will harm your crop.

Economic threshold and economic injury level (Fig. 1). The economic threshold is the pest population size or the level of damage that a crop can tolerate without economic impact. When the threshold is reached, some control should be implemented. The economic injury level is that point above which crop yield will be effected by pest damage, and the benefit of controlling the pest outweighs the cost. Often, thresholds have been established through scientific research. You may develop your own thresholds based on your scouting records and trends on your own farm, as well as what your markets may tolerate. Shareholders of a CSA may be more tolerant of some insect feeding than a high-end restaurant, for instance.

Management options. What pesticide options and other control strategies do you have available and how effective are they? Your economic threshold may be lower than those published if you are using organic materials, since economic thresholds are designed with conventional pesticides in mind and many organic materials are less effective than conventional materials. Or you may not have an effective control option for a current pest problem, but scouting and keeping records will help you prevent problems in the future by using crop rotations, row covers, or materials applied at-planting. Have some sense of what you will do with the information you collect.

Now to scouting! The idea here is to assess a random sample of plants that is representative of what is happening in the whole field or crop, or to identify hot spots or problem areas in the field or among different crops or varieties. Don't make spray decisions based on what you see on the first couple of plants in your sampling! You might panic because the first plant is covered in beetles, but then realize that the problem is localized and that the crop as a whole is well below threshold (Figs. 2 and 3).

First, take a look at the field as a whole and note if anything looks abnormal. Then, decide how you will divide the field into units. If you plan to look at 25 plants, decide about how frequently you would have to stop to get a sampling of the entire field.

We have scouting sheets for the following crops:

- | | | |
|--------------------------|--------------------------|----------------------------|
| Allium | Eggplant | Strawberry |
| Brassica | Pepper | Sweet corn |
| Cucurbit | Potato | Tomato |

Each sheet has a list of common pests, thresholds if available, along with some sampling instructions. Thresholds or control options may vary depending on the stage of the crop, so there is a place to note that as well.

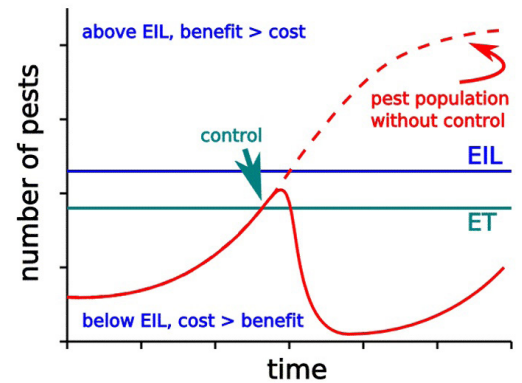


Figure 1. Relationship between economic threshold (ET) and the economic injury level (EIL)

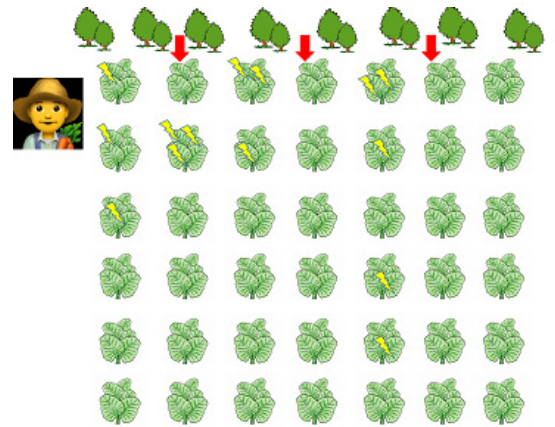


Figure 2. A farmer sees heavy pest pressure on the edge of a field near the tree line.

Image: S. Scheufele

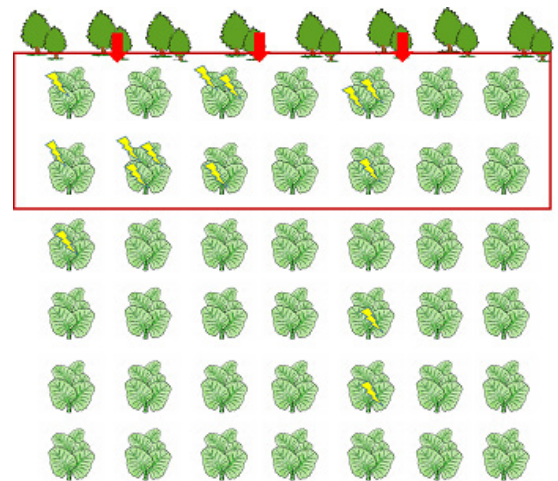


Figure 3. After surveying the whole field, the farmer finds that only the plants near the tree line have heavy pest pressure, while the whole field is under threshold and no treatment is necessary.

Image: S. Scheufele

For example, in potato you should scout 3 plants per site when the crop is small or 3 individual stalks once the plants are hilled. Note the unit you are using and what the threshold is.

Using the appropriate scouting sheet for the crop you are inspecting, move through the field, stopping at random spots—moving in a V or W pattern works best—and look at whatever plant(s) happen to be wherever you stop. It helps to count about the same number of paces between samples, so that you avoid getting a biased sample by inadvertently stopping at plants that are obviously affected or infested. Look at and around the plant, then inspect more closely—pests and symptoms can often be found on the undersides of leaves or on stems. It’s good to have a hand lens with you for looking at small insects or mysterious lesions. Record what you see in the appropriate line on the scouting sheet, along with any notes you think are important. There is a spot on the sheets labeled ‘scouting map’ so you can record your path. This may reveal that there is higher pressure on one area of the field, which can indicate where a pest is entering, or a preference for a certain variety.

When you have finished sampling, count your results. Take the average for whatever unit you are considering for your threshold—it may be insects per leaf, or damage per plant—and compare that number to your threshold. If you are above threshold, apply your control strategy. If you are below, wait to treat and scout again at some regular interval (e.g. the following week). If you implement a control, scout again afterward to determine if the treatment worked and when/if you should make another application. If you found natural enemies when scouting, consider them when deciding which material to use or whether a pesticide application is warranted.

Using these scouting sheets throughout the season and over multiple years can help you to identify trends and understand your pest levels and cycles and the effectiveness of your management strategies over time. If you do use the UMass scouting sheets, we’d love your feedback! Let us know if they help you manage your scouting program, and if you have suggestions for how they can be improved. Contact us at 413-577-3976 or umassveg@umass.edu.

We also have more detailed scouting guides for sweet corn and cucurbits:

[Sweet Corn IPM Guide](#)

[Cucurbit Disease Scouting and Management Guide](#)

Be sure to check out all of our Scouting Resources online [here](#), including our Pest Scouting Calendar (available in both [English](#) and [Spanish!](#)).

--Written by Lisa McKeag, UMass Vegetable Program

FLEA BEETLE MANAGEMENT

Flea beetles have emerged from their overwintering homes in the shrubby or wooded areas surrounding fields and are feeding now on spring brassica plantings. Controlling flea beetles can seem like a losing battle, but we have seen real success on farms that have taken an integrated approach to management. The most important steps to reducing the population size and damage caused by flea beetles seem to be breaking the cycle (rotating spring crops as far as possible from overwintering sites near last year’s fall crop), and controlling early season outbreaks using something like a trap crop or a “push-pull” approach to prevent the problem from spiraling out of control within the season or from building up to unmanageable levels over the years.

Life Cycle. There are two species of flea beetle that feed on brassica crops. The crucifer flea beetle (*Phyllotreta cruciferae*) is uniformly black and shiny, while the striped flea beetle (*Phyllotreta striolata*) has two yellow stripes on its back. Both are about 2 mm in length and hop away when disturbed. These flea beetles only feed on brassica crops; those found on corn or solanaceous crops are different species. Though they prefer the tender leaves of *Brassica rapa* and *B. juncea* crops such as arugula, tatsoi, mizuna, bok choy, and mustard, they will also feed on the



Top: Crucifer flea beetle feeding damage on a cotyledon.

Bottom: Striped flea beetle

more waxy *B. oleracea* crops such as broccoli, cabbage, kale, and collards. Their feeding damage—small, round holes on leaves or leaf margins, which can coalesce or expand to form large holes as leaves mature—can kill seedlings outright, delay maturity, and reduce yield and marketability of older plants. The adults that are active now will mate and lay eggs in the soil, and larvae will hatch in 11-13 days. Larvae will feed on the root hairs of brassica crops but do not cause noticeable damage. After about 2 weeks, the larvae will pupate, and emerge after another week as the next generation of adults in mid-June. This cycle repeats itself and a second summer generation emerges in late July to feed on fall brassica crops before moving outside of the field to forested areas for the winter. Flea beetle generations usually overlap over the course of the growing season, meaning there is rarely a lull in flea beetle activity.



Severe flea beetle feeding damage on brassica greens

Management:

Break the cycle. Plant spring crops far from fields where fall brassicas were grown, and where flea beetles will overwinter. When overwintering beetles emerge, if they can't find a host plant they will not survive and reproduce and you will reduce the population of flea beetles on your farm. You can also starve the overwintering beetles by delaying planting until June. This may not easily fit your markets, but it does work. With no food or place to lay eggs, the overwintered adults leave the area, instead of reproducing and emerging in time for midsummer dining. It may take 2-3 years to bring populations down. Be careful to control brassica weeds at the same time. It is also important to separate your fall crop from the spring crop, since second generation flea beetles will emerge at the same time that fall brassica crops will be at their most vulnerable. These second generation adults are also the beetles that overwinter, so next spring, plan to use a field distant from previous late-season brassica fields.

Row covers. Floating row cover or insect netting provide the most effective protection from flea beetles, especially in spring and early summer. It is expensive in both materials and time, but it works. Insect netting, such as Proteknet, Biothrips, and Filbio, are available in a range of mesh sizes and can be used to protect against a variety of pests, including flea beetles. These trap in less heat and allow for greater air circulation than spunbonded row covers, though for early spring crops, the additional warming benefit of traditional row covers of various weights may be preferred. Whatever cover you choose, it is critical to seal the edges immediately after planting to make sure you exclude the beetles. Flea beetles can fit through small openings—not to mention the large holes and tears that often develop in row cover over time. Fortunately, hoops are not needed on brassica crops, but management is still time-consuming

because the cover has to be removed for cultivation. Replace it as soon as possible to avoid letting beetles in.

Chemical control. Maturing plants should be scouted frequently. When plants are young, an average of 1 beetle per plant or 10% average leaf damage is a reasonable threshold for chemical intervention. Several synthetic pyrethroids (Group 3A), carbamates (Group 1A), neonicotinoids (Group 4A, either as foliar or soil drench), and diamides (Group 28) are labeled for flea beetle in brassicas. Avoid repeated use of one type of chemistry over multiple generations or using both soil and foliar applications of the same group. Systemic insecticides can provide longer-term control against damage, although beetles may still be seen when scouting. Diamide products (Exirel and Harvanta for foliar applications, Verimark for soil), are systemic and provide control against flea beetles as well as other brassica pests like caterpillars, cabbage aphid, and, if applied to the soil pre-plant, cabbage root maggot. Be aware that systemic insecticides



Kale treated with Surround is protected from damage while untreated bok choy used as a trap crop could draw flea beetles, where they can be sprayed. Photo: S. Scheufele

may have longer days-to-harvest intervals.

For organic farmers, the choice of effective chemistries is limited to spinosad (Entrust), kaolin clay (Surround), and pyrethrin (Pyganic). Entrust provides the best control; it works primarily by ingestion and remains active on the leaf surface for some time after application. Pyganic is a contact insecticide and is deactivated by sunlight and so does not provide any residual control but can provide short-term knockdown effects by killing any flea beetles hit directly by the spray. Surround is kaolin clay that coats the foliage, which flea beetles find unappealing. It must be reapplied as the plants grow or after rain. Growers often hesitate to use Surround because of difficulty mixing and spraying—some growers have found that using a masonry or sheet-rock drill to mix up the material in a 5-gallon bucket before adding to a backpack sprayer works to get the clay into suspension. If you want to apply Surround using a tractor-mounted sprayer you must have mechanical agitation or the material will not go into suspension and it will clog up your nozzles. It is probably worth figuring out how to do this if you struggle with getting your early season transplants to survive the onslaught of flea beetles, and it can also be useful in protecting cucurbit transplants from striped cucumber beetles, which vector bacterial wilt.

Control brassica weeds. Brassica weeds also harbor flea beetles (both adults and larvae) and reduce the efficacy of your crop rotation schemes that aim to break the pest cycle by changing crop families. [Yellow rocket](#), [wild mustard](#), and [shepherd's purse](#) are familiar weeds that are widespread in fields and roadsides. The list of weed hosts probably also includes [garlic mustard](#) (*Alliaria petiolata*), a serious invasive weed in the brassica family. It is a biennial with white blooms in spring (mid-May). It thrives in roadsides and field edges as well as shady woodlands, and has rapidly spread throughout Massachusetts.

Trap cropping. Take advantage of the flea beetles' preferences for particular brassicas by using the preferred species or varieties as a draw. Their numbers will build up in the more attractive plants, and can be killed there with an insecticide application, protecting the main crop and reducing spray area and time. A border or even a middle row planted to *Brassica rapa* or *B. juncea* crops such as komatsuna, tatsoi, mizuna, bok choy, or mustard has been shown to reduce numbers and feeding damage on less preferred *B. oleracea* crops such as broccoli, cabbage, or traditional kale (e.g. 'Winterbor' types). Red Russian kale (*B. napus*) and lacinato kale (*B. oleracea*) seem to be of intermediate attractiveness. To make it work, here are some tips:

- Make sure the trap crop is established before the main crop (the one you are trying to protect) or is at least as mature (e.g. transplanted same day). Direct-seeded crops can be used around transplants if seeded 7-14 days earlier.
- Use a fast-growing, vigorous cultivar for the trap crop.
- Use a border crop to prevent beetles from moving farther into the field. Traps at ends of rows help make a complete perimeter, which stops beetles coming from all directions. Interior trap crops also can act as a 'sink' within the field.
- Spray only the trap crop to kill the accumulated beetles, and to avoid having to spray the main crop. You also want to keep the trap crop healthy enough to do its work, and potentially be harvestable as well—you may need to fertilize, re-seed, or otherwise maintain this trap crop because if it gets too ragged, the beetles will not enjoy feeding on it and will move back into your main crop. Use a longer-residual product, if possible.
- Combine with a repellent on the main crop, e.g., coat the main crop with Surround WP and use a trap crop as part of a "push-pull" system.

--UMass Extension Vegetable Program

LEAFMINERS ON SPINACH, SWISS CHARD, AND BEETS

Spinach and beet leafminers are two closely related species of early-season pests that cause damage to early greens. As of today, leafminer larvae have been reported in Norfolk Co. on spinach. These pests attack crops and weeds in the plant family Chenopodiaceae, which includes chard, beets, and spinach as well as several weed species including lamb's quarters. The two fly species are very similar and have overlapping hosts. However, beet leafminers prefer laying eggs on beet leaves and spinach leafminer may also cause damage in Solanaceous crops such as peppers.

Life cycle. Crop damage is caused by the fly larva that burrows and feeds between the upper and lower epidermis of the



Top: Spinach leafminer eggs.
 Middle: Leafminer larva
 Bottom: Adult spinach leafminer

leaf. Early damage is a slender, winding ‘mine’ or tunnel, but as the larva feeds and grows these expand and become blotches on the leaves. The fly overwinters as a pupa in the soil and emerges in late-April and May. The adult—a small, gray fly 5-7 mm long—lays eggs on the undersides of host leaves. The small (<1mm), oblong, white eggs, are laid in neat rows on the underside of the leaves and hatch in 3-6 days. They are easy to spot if you look under the leaves. If you find tunnels, pulling the epidermis off will reveal one or several pale, white maggots. When fully grown, maggots usually drop into the soil to pupate, though they may also pupate inside the leaf. The entire life cycle is 30-40 days and there are three to four generations per season. Typically mid- to late-May, late-June and mid-August are peak activity periods. These generations overlap and can cause continuous season-long damage to succession-planted spinach, beets, and chard. After August, pupae enter the overwintering phase and won’t emerge until next spring.

If the plants are infested early and populations are high, losses from this pest may be great. This may be especially true when eggs on transplants in the greenhouse go unnoticed until planting in the field, resulting in infestations in row-covered crops.

Management

Chemical control. Treat when eggs or first tiny tunnels are noticed. Scout again 7-10 days after treatment to determine if follow-up treatment is needed. Use an adjuvant to improve efficacy unless the product label advises not to. Ensure good coverage of the lower leaf surface.

Labeled conventional materials include abamectin (e.g. Agri-Mek) and Proclaim (Group 6), Coragen, Exirel, and Verimark (28), Trigard (17), Venom and Platinum (4A), Pounce (3A), and Radiant (5). Of those, only Radiant is labeled for use on beets. Brigade (3A) and Harvanta (28) are also labeled for use on spinach. The diamides (Coragen, Exirel, Verimark, Harvanta) and neonicotinoids (Venom, Platinum) are systemic and may be

applied to transplants or to the soil. Radiant has some translaminar activity, particularly when combined with a penetrating adjuvant, and may be effective against larvae in leaf mines.

The most effective OMRI-listed material is spinosad (e.g. Entrust). Apply before egg hatch. Like Radiant, Entrust has some translaminar activity and may be effective against larvae within the leaf.

Cultural controls. Because leafminer feeds mostly on one crop family and also on many weeds including chickweed, lamb’s quarters and nightshades, weed control and crop rotation are the first line of defense. Rotate beet, chard and spinach to new fields in the spring and during the growing season. Avoid spring plantings near tunnels where winter greens were grown. Row covers can be used to exclude flies if placed over the crop before flies are active or immediately after planting, though be sure not to cover crops in fields where susceptible crops were grown previously and where adult flies may be emerging, as they will get trapped under the row cover.



Large tunnels created by leafminer activity

--Adapted by UMass Vegetable Program from an article by Eric Sideman, Maine Organic Farmers and Gardeners Association, and the New England Vegetable Management Guide

UMASS EXTENSION IS HIRING!

UMass Extension is pleased to announce that we are now accepting applications for **two Extension Educator positions!** If you or someone you know wants to join our team of educators providing science-based information for Massachusetts growers, please see the job summaries listed below. The default location for all positions is the UMass Amherst campus, with opportunities for hybrid work arrangements. Candidates who wish to be considered for more than one of the positions below need to **apply for each position individually**. Positions will remain open until filled.

- The **UMass Extension Fruit Team** is currently hiring one **Extension Educator III (MS-level)**. The successful candidate for the Educator III position will have expertise in tree or small fruit crop and pest management and will work with other members of the Fruit Team to provide science-based educational programming and technical assistance to commercial fruit growers in MA and conduct applied research on relevant crop and pest management topics. Special consideration will be given to candidates with expertise in plant pathology and/or small fruit production. For more details please see the full position descriptions linked below.

Priority deadline: June 12, 2023

For more details and to apply:

Fruit Extension Educator III: <https://careers.umass.edu/amherst/en-us/job/518181/fruit-extension-educator-iii-umass-extension>

- The **UMass Soil and Plant Nutrient Testing Lab** is hiring a **Soil Health Educator IV** who will develop and deliver recommendations to customers and educational resources relevant to soil fertility and health, with potential for some applied research projects. They will collaborate with Extension professionals across multiple teams in production agriculture, commercial horticulture, and urban agriculture. This is a MS-level position requiring significant experience, with a preference for candidates with expertise in analytical testing and practical recommendations in soil fertility and health. This is a 24-month appointment that may be extended pending funding availability. For more details please see the full position descriptions linked below.

Priority deadline: June 1, 2023

For more details and to apply:

Soil Health Extension Educator IV: <https://careers.umass.edu/amherst/en-us/job/518166/extension-educator-iv-soil-health-umass-extension>

UFW FOUNDATION ACCEPTING APPLICATIONS FOR USDA'S FARM AND FOOD WORKER RELIEF PROGRAM

[The U.S. Department of Agriculture \(USDA\) Farm and Food Worker Relief \(FFWR\) Grant Program](#) awarded approximately \$667 million in grants to fourteen nonprofit organizations and one Tribal entity through Consolidated Appropriations Act of 2021 funds. The purpose of this program is to defray worker expenses incurred preparing for, preventing exposure to, and responding to the COVID-19 pandemic. Workers may only receive one \$600 payment per person, and they must have worked in the U.S. during the pandemic.

Farm workers across the U.S. can now apply for the \$600 COVID-19 pandemic relief payments through [UFW Foundation](#). UFW Foundation will be distributing a one-time \$600 relief payment to farm workers affected by the COVID-19 pandemic who qualify. There is no cost to apply for the program. You can only apply once; additional applications will be denied.

Relief payments are available to frontline agricultural workers who worked during the COVID-19 pandemic. For more information on the program, eligibility, and how to apply, visit: <https://www.ufwfoundation.org/ffwr>.

APPLICATION PERIOD OPEN FOR USDA RURAL ENERGY FOR AMERICA PROGRAM (REAP)

The USDA is accepting applications for grants to help agricultural producers and rural small businesses invest in renewable energy systems and make energy-efficiency improvements. USDA is making the \$1 billion in grants available under the Rural Energy for America Program (REAP) funded under the Inflation Reduction Act. For application

information, eligibility and deadlines see, [Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants](#).

APPLICATION PERIOD OPEN FOR SEVERAL MDAR GRANT PROGRAMS

The Massachusetts Department of Agricultural Resources (MDAR) is accepting applications from Massachusetts farmers who wish to participate in one of these Department programs. The Request for Responses (“RFR”s) containing program details and the application form is posted on CommBuys and can be accessed through a link on each program website below. If you would like an application mailed to you, contact the program coordinator listed.

To learn more about these programs, access this video link to the [Recorded Grants Webinar](#) held on March 21, 2023.

MDAR is currently accepting applications for the following programs:

[Climate Smart Agriculture Program \(CSAP\)](#)

The Climate Smart Agriculture Program links MDAR’s water, energy and climate grants together into one application. This includes the Agricultural Climate Resiliency & Efficiencies (ACRE) Program, the Agricultural Environmental Enhancement Program (AEEP), and the Agricultural Energy Grant Program (ENER). By bringing these three grants under one program, MDAR is seeking to simplify the application process for applicants. This program continues the goals of the three individual grants by implementing projects that help the agricultural sector adapt to climate change, mitigate climate change, reducing or preventing impacts to natural resources that may result from agricultural practices, and that improve energy efficiency and facilitate adoption of alternative clean energy technologies.

Applications are due by 4:00pm on Friday, May 26, 2023.

Questions: Contact Laura Maul at (617) 626-1739 or Laura.Maul@mass.gov.

[Agricultural Food Safety Improvement Program \(AFSIP\)](#)

This grant program is for the implementation of practices that prevent or reduce food safety risks for produce or aquaculture operations, meet regulatory requirements, and improve market access.

Applications are due by 4:00pm on Friday, May 26, 2023.

Questions: Contact Laura Maul at (617) 626-1739 or Laura.Maul@mass.gov.

[Massachusetts Food Ventures Program](#)

This grant program funds projects that support food ventures in low or moderate income communities. This includes Gateway Cities and rural communities. Participants selected by the program will be reimbursed up to \$500,000, and the minimum award is \$100,000.

Applications are due by June 13, 2023.

Questions: Contact Rose Arruda at 617-626-1849 or Rose.Arruda@mass.gov.

[Urban Agriculture Program](#)

This grant program advances agricultural goals and objectives of Massachusetts. The program funds infrastructure needs, innovative food production, zoning ordinances, technical assistance, land acquisition, and youth leadership development.

Applications are due by May 22, 2023.

Questions: Contact Rose Arruda at 617-626-1849 or Rose.Arruda@mass.gov.

[Cranberry Bog Renovation Grant Program](#)

Funding to implement cranberry bog renovations that promote more efficient bogs both in design and production while enhancing the business and environmental sustainability of the cranberry operation.

Applications are due by 4:00pm on Friday, May 26, 2023.

Questions: Contact Laura Maul at (617) 626-1739 or Laura.Maul@mass.gov.

FOOD SAFETY EMPLOYEE TRAINING WORKSHOP AND RESOURCES

UMass Food Safety for Farmers website – Worker health, Hygiene, and Training

<https://ag.umass.edu/resources/food-safety/for-farmers/worker-health-hygiene-training>

Describes general recommendations and FSMA PSR training requirements. Also includes a list of Worker Training Guides and Videos—some in both English and Spanish—that can guide or be incorporated into employee training programs.

FARMER CIRCLES WITH SOUTHERN NEW ENGLAND FARMERS OF COLOR COLLABORATIVE

The Southern New England Farmers of Color Collaborative is inviting farmers of color to [sign up by May 31, 2023](#), for Farmer Circles in Connecticut, Massachusetts, Rhode Island, and New Hampshire. Farmer Circles are peer learning communities for farmers interested in discussing a certain topic in an informal, supportive environment. Each circle meets for at least 12 hours over the course of about one year and is facilitated by another farmer with interest in the subject. There are no teachers or students in the circles, just a community of farmers coming together to learn from each other. Group meetings can take place online or in person, with a schedule set by the participants. Participants will receive a stipend at the end of the year, in April 2024, of approximately \$15/hr of participation. [Sign up here.](#)

FDA RELEASES FSMA TRACEABILITY RULE SMALL ENTITY COMPLIANCE GUIDE

On November 21, 2022, FDA published the final rule entitled, “Requirements for Additional Traceability Records for Certain Foods” (Food Traceability Rule). Details about the regulation can be found [here](#).

This guidance document is intended to help small entities, including farms and small businesses, comply with the requirements of the Food Traceability Rule as established in 21 CFR part 1, subpart S. The regulations are binding and have the full force and effect of law. FDA’s guidance documents, including this guidance, do not establish legally enforceable responsibilities. Instead, guidances describe our current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word should in FDA guidances means that something is suggested or recommended, but not required.

[Access the Guidance Document here.](#)

FRUIT AND VEGETABLE GROWER FEEDBACK NEEDED ON PRODUCE SAFETY COSTS, NEEDS, AND BARRIERS

The Produce Safety Alliance (PSA) Team and personnel from the Northeast Center to Advance Food Safety (NE-CAFS) at the University of Vermont would like to understand the costs and the barriers of beginning or expanding food safety practices on farms and in packinghouses to make educational materials more relevant to fruit and vegetable growers and packers. To do this, we have developed a survey to collect food safety information from fruit and vegetable growers across the country.

What are the Goals of this Survey?

To understand:

- what steps growers have taken toward adopting food safety practices on their farm,
- the costs of adopting food safety practices (both one-time and reoccurring), and
- where growers have questions about food safety.

Why Should You Participate?

The detailed information that is provided will allow future educational materials to be tailored to specific challenges that growers are facing.

Who Should Participate?

We are looking for feedback from people involved in fruit and vegetable production and packing, including those who have and who have not adopted food safety practices. This survey should be completed by someone who has knowledge about the operation’s produce safety practices (e.g., equipment, finances, supplies, training, market distribution, third-party audits).

Participation is voluntary and anonymous. It will take 10 – 30 minutes to complete the survey, depending on the farms' food safety practices.

By completing this survey, you can choose to be entered into a raffle to win a \$75 prepaid credit card. Ten participants will randomly be selected to win. The raffle will be held when the survey closes, approximately June 1st. If selected, you will be contacted to confirm your mailing address and acknowledge acceptance of the \$75 prepaid credit card.

English-language survey: https://qualtrics.uvm.edu/jfe/form/SV_agW9o6VWOUCCivCC

Spanish-language survey: https://qualtrics.uvm.edu/jfe/form/SV_agW9o6VWOUCCivCC?O_Language=ES

EVENTS

PEST AND DISEASE CONTROL FIELD WALK WITH UMASS EXTENSION & EASTERN MA CRAFT

When: Wednesday, June 21, 4-6pm, Pest and Disease Control with UMass

Where: High Road Farm, 186 High Rd., Newbury, MA. Please drive down the private driveway and you'll see parking options near the barn and greenhouse.

Join Sue Scheufele of the UMass Extension Vegetable Program and Eastern MA CRAFT (Collaborative Regional Alliance for Farmer Training) for a pest walk at High Road Farm in Newbury, MA. We will tour the farm and discuss pests that are currently active, how to scout for them, and how to manage them.

UNH EXTENSION AND NEW HAMPSHIRE VEGETABLE & BERRY GROWERS' ASSOCIATION WASH AND PACK SHED TWILIGHT SERIES

The Day in the Life of a Wash Pack Shed: Part 1

When: Thursday, June 22, 5:30 - 7:45pm

Where: Wilson Farm, 144 Charles Bancroft Highway, Litchfield, NH 03052

This meeting will touch on the daily flow of product through the pack shed, record-keeping systems, water management, and daily sanitation. A special focus will be on Wilson Farm's SOPs and the process for maintaining and cleaning its brush wash conveyor.

Attendees will also get a chance to see the farm's newly constructed Pesticide Storage facility. Join extension specialists in a conversation about facility construction, and pesticide mixing and loading considerations. See firsthand how a well-designed pesticide storage shed can help prevent accidental exposure to pesticides, protect the environment, and maintain the quality and effectiveness of the chemicals.

For the full agenda, see: [Wash and Pack Shed Meeting Part 1](#)

The Day in the Life of a Wash Pack Shed: Part 2

When: Tuesday, July 11, 5:30 - 7:30pm

Where: Longview Farm, 175 Quincy Rd, Plymouth, NH 03264

Longview Farm finished construction on a new wash pack shed in 2021. The owners will discuss the construction, design, and flow decisions that went into re-modeling a dairy barn into a working wash pack shed. We will also discuss the farm's process and equipment for washing vegetables and practical factors to consider when adding sanitizer to the wash water. Bring your questions and experience!

For the full agenda, see: [Wash and Pack Shed Meeting Part 2](#)

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Vegetable Notes. Genevieve Higgins, Lisa McKeag, Maggie Ng, Susan Scheufele, Hannah Whitehead co-editors. All photos in this publication are credited to the UMass Extension Vegetable Program unless otherwise noted.

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