



UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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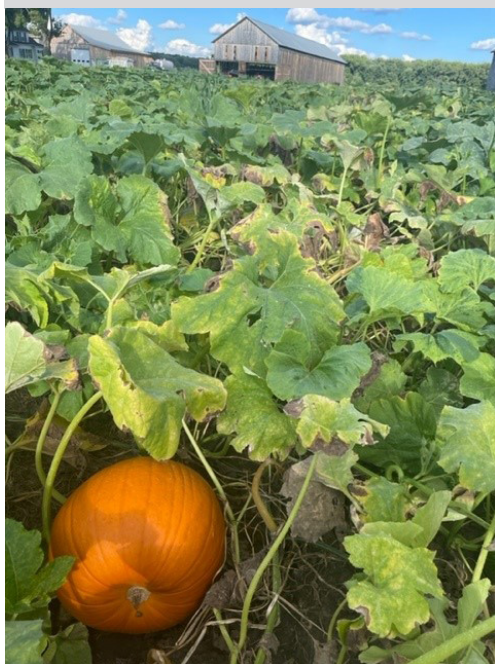
August 25, 2022

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CROP CONDITIONS

Some relief came this week, with at least a quarter inch of rain falling across the whole state, with most areas receiving an inch or more—over 3 inches in some parts of southeastern MA. For many crops it's too little too late, and folks have had to make hard decisions about which crops they can keep growing and which they need to let go. We are seeing lots of signs of drought and heat stress across the state. Notably, squash foliage is starting to yellow and die back from the leaf edges, leaving ripe fruit exposed underneath. As pictured, lots of pumpkins are already ripe. As we wrote last week in Crop Conditions, it is best to leave these on the vine as long as possible as long as the conditions stay dry and rots are kept at bay, and foliage is present to protect from sunscald. If you need to bring them in, we put out a detailed article on winter squash and pumpkin storage last week, but to briefly recap, here are ideal storage conditions for winter squash and pumpkins, from [Handbook 66](#):



Pumpkins are ripening a little too early this year, and this field in Hampshire County is no exception. Photo: S. B. Scheufele

Pumpkin and winter squash should be stored at 50 to 55 °F. At higher temperatures of 59 to 68 °F, green varieties will become undesirably yellow and acquire a stringiness of the flesh. Fruit are chilling sensitive. The relative humidity (RH) should be 50 to 70%. Higher RH promotes decay while lower RH causes excess weight loss and texture deterioration. The fruit surface should be kept dry, and storage rooms should have good air circulation. Pumpkins generally do not keep as well as hard-shelled winter squashes. Most cultivars of winter squash and pumpkins, as well as the tropical pumpkins, cannot be stored for more than 2 to 3 months. Acorn-type squashes, such as 'Table Queen,' can be kept 5 to 8 weeks at 50 °F. The popular butternut squash can be kept 2 to 3 mo. at 50 °F. It is often stored longer, but spoilage and shrinkage increase. Weight loss should be kept below 15% to minimize development of hollow neck. Turban and buttercup squashes can be kept 3 mo. Good quality Hubbard squash can be stored 6 mo. at 50 to 55 °F and 70% RH. A 15% loss in weight after 6 mo. is about average.

It's hard to feel anything but tired at the end of August, one farmer shared this week. This has been a grueling year with the ongoing drought and extra task of irrigation. It's difficult to be exhausted both by struggling crops that need irrigation and by thriving crops that are producing a lot to harvest! It's physically a very tough year, and folks are tired. With so much bounty, some markets are saturated, and prices might not be staying as high as they were in early summer before gas prices spiked and customers started really pinching every penny. We see you out there working longer and longer days, and nights and weekends, and we hope you feel proud of the work you do and the bounty you have grown. And get some rest!!! If you can sneak away for an evening, we'd love to see you at our Twilight Meeting at Harvest Farm in Whately on September 8th where farmer Gary Gemme and UVM Extension's Chris Callahan will talk about the steps in the cold chain and Gary's post-harvest facilities. Take a break and enjoy some fine pizza with your friends and neighbors on us!!! Let us know if you're coming [here](#).

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 *We are currently working remotely but checking these messages daily, so please leave us a message!* **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

Thrips: Severe thrips damage has built up in leeks in areas with high pressure that haven't been treated. Thrips damage appears as silvery flecks and streaks on foliage, sometimes accompanied by flat, shiny specks of frass about the size of the period at the end of this sentence. Once thrips populations have built up, they can be hard to control with pesticides. Earlier in the season, pesticides can be applied at a threshold of 1-2 thrips/leaf (organic growers should use the lower threshold). For next year, labeled conventional materials include neonicotinoids (e.g. Assail, Admire Pro), pyrethroids (e.g. Delta Gold, Declare, Warrior, Pounce, Mustang), spinetoram (e.g. Radiant), and spirotetramat (e.g. Movento). Movento and the neonicotinoids are systemic or translaminar and will work by ingestion; pyrethroids work on contact and will not have long residuals. The most effective OMRI-listed material is spinosad (e.g. Entrust), which can be tank-mixed with a spreader sticker or insecticidal soap (e.g. M-Pede) to increase efficacy.

Allium leafminer: The fall flight of ALM is expected to begin in a few weeks, in mid-September, so start keeping an eye out or cover susceptible crops now with row cover or netting. These flies will be emerging from fields that were infested with ALM this spring. The flies will lay eggs in any remaining allium foliage, which, at this time of year, is usually just leeks. The flies are active for ~7 weeks, or through the end of October. We will include additional notifications here in Pest Alerts when we expect the fall flight to be beginning. As long as your fall leeks are not planted into soil that was infested with ALM this spring, row covers applied before flight begins will exclude the flies. Tack down row covers solidly in order to fully exclude the flies. If you plan to control ALM with pesticides, effective materials include dinotefuran (e.g. Scorpion, Venom), cyantraniliprole (e.g. Exirel), and spinetoram (e.g. Radiant). Applications of the above materials will target larvae within the leaves and so don't need to be applied until after oviposition marks are seen in your crop. Organic growers can plan to apply a tank mix of Entrust (6 oz/A) + M-Pede (1-1.5% v/v solution).



Silver flecking on onion leaves, caused by thrips.

Brassicas

Caterpillars are causing significant damage in untreated fall brassica plantings. At this point in the season, all four species of brassica caterpillars are present in the region: [imported cabbageworm](#), [diamondback moth](#), [cabbage looper](#), and [cross-striped cabbageworm](#). A pesticide treatment is warranted in heading brassica crops (e.g. cabbage, broccoli, cauliflower) if 20% or more of plants are infested with at least 1 caterpillar. Use a 10-15% threshold for leafy brassicas and heading brassicas *after* head formation. Effective conventional products include spinosyns (e.g. Radiant), pyrethroids (work on contact only, e.g. Fastac, Baythroid XL, Brigade, Asana, Danitol, Declare, Warrior, Pounce, Mustang), diamides (more expensive but systemic and have long residuals, e.g. Verimark or Coragen), Proclaim (FRAC group 6), Avaunt (22), and Torac (21A). Bt products (e.g. Dipel, Xentari) are the most effective OMRI-listed materials but if flea beetles are also present Entrust is another good choice. Use a spreader-sticker to help materials adhere to waxy brassica leaves, unless label says otherwise.

Cucurbits

Cucurbit downy mildew was confirmed on pumpkin this week. There are 2 clades of the cucurbit downy mildew

pathogen. Clade 2 affects cucumber, cantaloupe, and, less frequently, watermelon, and arrives in New England before clade 1, which affects pumpkins, winter squash, and summer squash/zucchini. CDM clade 2 has been present on cucumber and cantaloupe



*Cucurbit downy mildew symptoms on giant pumpkin (left) and butternut squash (right).
Photos: M. T. McGrath*

in MA since July. Symptoms of CDM on clade 2 hosts can look very different from those on cucumber, which growers are usually more familiar with. On pumpkin, lesions are more diffuse, being less clearly defined by the leaf veins. Gray sporulation may be visible on the undersides of leaves with a hand lens. If you have pumpkins or winter squash in the field with lots of healthy foliage and you are trying to hold the fruit in the field as long as possible, begin making applications of both a broad spectrum fungicide and a downy mildew-targeted material. DM-targeted materials that are currently recommended are: Orondis (FRAC 9), Omega (29), Ranman (21), Zampro (40 + 45), Zing! or Gavel (22), Ariston, Curzate, or Tanos (27), and Previcur Flex (28). Presidio, Revus, and Forum are not currently recommended because of disease resistance. Rotate between FRAC groups to prevent resistance development.

Location	Captures
Whately	0
Leominster	8
Sharon	11
Southampton	0

We also saw [cucurbit powdery mildew being colonized by saprophytic *Alternaria*](#) this week, which looks a lot like downy mildew! Contact us if you suspect downy mildew in your cucurbit crop and want to confirm.

We are seeing high levels of [viral infections](#) in both winter and summer squash crops this year. It's not clear why we're seeing so much virus; many cucurbit viruses can be seedborne, and most cucurbit viruses are vectored by aphids, which tend to thrive in hot, dry conditions, which we've certainly been experiencing.

Lettuce

Rhizoctonia bottom rot and root rot was diagnosed in high tunnel lettuce in Middlesex Co. this week. This is a fungal disease that we usually see in wet fields—this year in the dry weather, it may be occurring in high tunnel crops that have received too much water. Bottom rot results in melting away of the lowermost leaves in a lettuce head and a rot that moves from the bottom of the plant upward. *Rhizoctonia solani* is a weak pathogen with a wide host range and is found in most soils but can only cause disease in young, damaged, slow-growing, or waterlogged plants. Incorporate diseased plant residue promptly to speed up breakdown, and avoid overwatering in the next crop. Cultivars with upright growth habits are less susceptible.



Rhizoctonia bottom rot in lettuce. Photo: G. Higgins

Nightshades

Pepper maggot larvae were found tunneling in pepper fruit at a farm in Hampshire Co. this week. Pepper maggot adults are flies that emerge in mid- to late-July and lay eggs directly into immature pepper fruit. Eggs hatch after about 10 days and white maggots feed within the fruit wall before leaving the fruit to pupate in the soil. Feeding damage allows for the entry of soft rot bacteria. Activity of this pest is very localized and varies by farm, region, and year. Many farms never have a problem with this pest. Chemical control needs to target the adult fly because eggs and lar-

vae are protected beneath the fruit skin and within the fruit itself, so once maggots are present in fruit, it is too late to control with pesticides. Begin scouting pepper crops in mid-July and make an insecticide application as soon as the first stings are observed. Make 2-3 applications, 10-14 days apart. Cultural practices can also significantly reduce pepper maggot populations: disc and plow pepper residue as soon as harvest is done to kill larvae and pupae; practice far rotations of pepper crops; cover pepper crops with insect netting during egg laying (beginning mid- to late-July); remove infested fruit from the field and destroy; use plastic mulch and/or weed mat to prevent larvae from reaching the soil to pupate.



Pepper maggot in a lunchbox pepper:

Photo: G. Higgins

Sweet corn

[Corn earworm](#) trap counts ranged from 1 to 98 this week, with an average of 29 moths caught per trap. Almost all trapping sites are on a 4-day spray schedule. More sites are catching [fall armyworm](#) this week compared to last, although trap counts remain fairly low. [European corn borer](#) trap counts are also low at most sites, with a range of 0 to 14 and an average of 3.78 and 0.28 moths/trap for the NY and IA strains, respectively.

Table 2. Sweetcorn pest trap captures for week ending August 25						
Location	GDD ¹ (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
Western MA						
Deerfield	-	1	1	0	26.5	4 days
Feeding Hills	2305	3	0	3	23	4 days
Granby	2230	0	0	3	11	4 days
Hatfield	2191	2	1	-	27	4 days
Whately	2308	1	0	0	26	4 days
Central MA						
Leominster	2201	1	0	0	32	4 days
North Grafton	2029	8	0	0	18	4 days
Sutton		1	0	0	11	4 days
Spencer	2125	1	0	0	6	5 days
Eastern MA						
Bolton	2222	1	0	6	11	4 days
Concord	2212	1	0	2	69	4 days
Haverhill*	2321	8	0	12	54	4 days
Ipswich*	2083	10	0	0	55	4 days
Littleton	-	1	0	1	1	no spray
Millis	-	14	2	n/a	6	5 days
North Easton	2247	-	-	-		
Sharon		0	1	0	28.5	4 days
Sherborn	2279	7	0	1	13	4 days
Seekonk	2483	3	0	3	49	4 days
Swansea		6	0	2	98	4 days
- no numbers reported for this trap						
N/A this site does not trap for this pest						
¹ GDDs are reported from the nearest weather station to the trapping site						
*Trap counts are from the previous week						

FALL SOIL TESTING

Although soil samples can be taken any time of year, many prefer to take samples in the fall. This allows time to apply any needed lime to adjust pH, plant a cover crop to recover any leftover nutrients, make a nutrient management plan, and order materials well in advance of spring planting. Furthermore, the UMass Soil Testing Lab and most similar labs experience delays in the spring due to high demand, but turn results around faster in the fall and winter.

Soil Sampling Tips

It is best to take soil samples at the same time of year for the most consistent and reliable results. Avoid sampling when the soil is very wet or soon after a lime or fertilizer application. If a field is uniform, a single composite sample is sufficient. A composite sample consists of 10 to 20 sub-samples taken from around the field that are then mixed together. To obtain sub-samples, you may use a spade to take thin slices of soil representing the top 6” to 8” of soil. A soil probe is faster and more convenient to use than a spade. Make sure to remove any thatch or other organic debris such as manure from the surface before taking your sample, as this will result in inaccurate soil organic matter levels. Put the slices or cores into a clean container and thoroughly mix. Take about one cup of the mixture, spread it out on paper to dry it at room temperature, put it in your own zip lock bag, and tightly seal it. Label each sample on the outside of the bag, and fill out the sample submission form thoroughly – see links below. While the preceding instructions are correct for the UMass Lab, make sure you follow specific sampling, packaging, and labeling instructions for any lab you use.

In many cases, fields are not uniform. There are many reasons for this, including uneven topography, wet and dry areas, different soil types, and areas with varying previous crop and fertilizing practices. For example, a known problem area might be a place in the field where a tractor accidentally dumped an excess amount of lime. In such cases, the field should be subdivided and composite samples collected and tested for each section. Alternatively, known problem areas can be avoided entirely.

Soils should be tested for organic matter content every two or three years. Organic matter testing is not included in standard UMass Soil Lab tests, so be sure to request it on the sample submission form. A standard soil test at the UMass Soil Lab costs \$20; organic matter is an additional \$6.

Submitting Soil Samples

It's important to request the appropriate test for the type of material you are submitting – e.g. field soil vs. soilless greenhouse media vs. high tunnel soil. Different materials are tested with different procedures that mimic how nutrients will become available to plants in the relevant field or greenhouse setting. If you have any questions about what type of test to request, you can contact the UMass Soil Lab at soiltest@umass.edu or the UMass Vegetable Program at umassveg@umass.edu or (413) 577-3976.

[Ordering information and forms for the UMass Soil Lab are available here.](#) For Routine Soil Tests for field soil, commercial growers should use the [Commercial Vegetables and Fruits](#) order form. Nutrient recommendations for commercial tests will be given in *pounds per acre*. Home gardeners should use the [Home Grounds and Gardening](#) order form, which will provide recommendations in *pounds per 100 square feet*.

The UMass Soil Lab is currently offering standard soil tests, pre-sidedress nitrate tests (PSNTs), soil texture analysis, and soilless greenhouse media tests. Manure or compost analysis and plant tissue analysis is available through the [University of Maine Soil Lab](#).

Types of Fall Soil Tests

The most common tests to request in the fall are standard soil tests and nitrate tests.

A standard soil test includes phosphorous, potassium, calcium, magnesium, and sulfur, as well as micronutrients. The standard test automatically includes pH, but does not include nitrate or organic matter; these additional parameters can be requested as add-ons to the standard test. Results from a standard soil test will inform how much of what type of fertilizer or soil amendment you should add to a field for next season's crop. When submitting your soil sample for testing, you can include a crop code on the form for the crop to be grown in that field the following year, and you'll receive nutrient recommendations based on that crop's nutrient needs and the soil test results. Haven't prepared your crop rotation plans yet? No worries. You may ask for recommendations for up to 3 different crops without extra

charge. The Home Grounds and Gardening form gives you the option to request general vegetable nutrient recommendations instead of crop by crop—this can also be useful for small-scale commercial growers if you don't want to tailor your fertilization to each crop.

Nitrate levels are evaluated separately from the standard soil test. A mid-season nitrate test will tell you if sidedressing with nitrogen (N) is necessary, and a fall nitrate test will tell you how closely crop N uptake has been matched with nitrogen supply for the season. High (> 20 ppm) soil nitrate content in the fall indicates that too much N fertilizer was applied that season. A fall nitrate test will inform the decision of whether to increase or decrease N fertilizer applications next season and whether you should plant a fall cover crop to scavenge and store the excess N for next spring. Nitrate is very ephemeral in soils and is easily lost to leaching and to the air, so nitrate left in the soil at the end of the season will not be there next spring. If you have high soil nitrate content in the fall, planting a fall cover crop will scavenge this N. When the cover crop is tilled in the following spring, the N will then be available for your next cash crop. At the UMass Soil Lab, use the [Pre-Sidedress Soil Nitrate Test form](#) to submit a nitrate test soil sample, or check the box for nitrate on the standard soil test submission form; it is only an additional \$8.

Interpreting Results and Choosing Amendments

Soil test results are primarily used to calculate fertilizer and other amendment needs for the following spring. We are able to provide fertilizer calculation support for commercial growers – contact us at umassveg@umass.edu. Or, see our [Calculating Fertilizer Applications](#) article for a step-by-step description. The UMass Soil Lab also provides a fact sheet on [Interpreting Your Soil Test Results](#), with an explanation of all the information that appears on your results. In addition to fertilizers, there are several other common soil amendments that can be considered, based on fall soil test results. Below are explanations of some amendments:

Lime: Most New England soils are naturally acidic (pH of 4.5 to 5.5) and need to be limed periodically to keep the pH in the range of 6.0 to 7.0, which is ideal for most vegetable crops and beneficial microbes. Heavier soils or soils with high organic matter will buffer pH change better than sandy soils, and soil lab lime recommendations will take this into account. Lime can be applied any time, but fall is preferred to allow several months to raise the pH. Split applications (half in the fall and half in the spring) may also be effective. Use dolomitic lime if your soil has low magnesium and calcitic lime if not. See our [Soil Acidity and Liming](#) article for more details on liming.

Compost is often applied in order to increase soil organic matter. However, do not overlook the fact that composts contain nutrients which are soluble and available for crop use just like commercial fertilizers. Composts usually primarily add phosphorous to soils. Composts do also usually contain N, but only about 10% of the total N content in compost is available to the crop each year. If not applied to actively growing crops, phosphorous from composts can be lost to the environment.

Nutrient levels in composts can vary widely – e.g. phosphorous levels can vary from 0.1-3% – so analysis is important for determining rates of application. A compost analysis should be completed to measure nutrient availability and to determine if the product is finished before applying to the field. Unfinished compost applied to the field may harbor pathogens or harm crops as it continues to decompose. Ammonium content below 100mg/kg and a carbon:nitrogen ratio of 20:1 indicates a finished compost. Higher amounts of ammonia indicate active decomposition, or unfinished compost. The C:N ratio is reduced as microbes break down carbon content in the pile and convert it to CO₂. Compost analysis is available through the [UMaine Soil Lab](#).

Matured compost applications are usually made in the spring; however, testing may happen in the fall in order to estimate plant available nutrients for next year's crop and help determine future compost application rates.

Manure is an excellent source of nutrients, however, as manure ages and decays, considerable nutrient loss occurs from leaching, surface runoff, or volatilization of ammonia into the atmosphere. Manure may also contain pathogens such as *E. coli* and *Salmonella*. If manure is used, vegetables should not be harvested before 120 days after application (or 90 days for vegetables that do not contact the soil, such as peppers, tomatoes, or eggplant). This time interval comes from the National Organic Program Standards. Certified organic producers must use this application interval, and for food safety purposes it is recommended for all growers. Ideally, manure should be applied in the fall or to a non-food rotation crop. Fall-applied manure should be incorporated immediately and a winter cover crop should be planted to protect N from leaching. Make manure applications in cold weather to reduce volatilization, but not to frozen ground, as this increases surface runoff potential. In no-till systems, research has shown that surface-applying manure to a growing cover crop will

reduce nutrient losses compared to surface applications to bare ground. In order to make accurate nutrient applications to best fit your crop needs, a manure analysis should be conducted—manure analysis is available through the [UMaine Soil Lab](#). Be sure to submit your samples in a tightly sealed container or the postal service will be very unhappy with you!

Cover crops planted in the fall, (historically before September 15, although that date is moving later and later every year), are an excellent way to capture and store nutrients for your crops in the following spring. All cover crops will scavenge leftover N, but different cover crop types add or immobilize different amounts of plant-available nitrogen (PAN) to the soil when incorporated in the spring.

Legume cover crops provide up to 100 lb PAN/A when incorporated, because they fix nitrogen from the air. To maximize PAN contribution from legumes, kill the cover crop at bud stage in the spring.

Cereal cover crops *immobilize* up to 50 lb PAN/A because the high carbon content leads to a spike in soil microbe activity, which ties up the nitrogen in the soil. To minimize PAN immobilization from cereals, kill the cover crop during the early stem elongation (jointing) growth stage.

Legume/cereal cover crop mixtures vary widely in how much PAN they add to the soil, depending on legume content. When the dry matter from a cover crop mix is 75% from cereals + 25% from legumes, PAN contributions is usually near zero when incorporated. Higher legume content means higher PAN contribution and higher cereal content means more N immobilization.

Micronutrients: Standard soil tests are calibrated for macronutrient content levels. Because micronutrient levels in soil are comparatively low, these levels are not accurately measured by standard soil tests. Plants require very low levels of most micronutrients and it is generally uncommon to have micronutrient deficiencies in New England soils. The listed “recommended” ranges are not optimal ranges, as they are for macronutrients, but instead are the typical ranges found among samples submitted to the lab. The best way to diagnose and address micronutrient deficiencies in vegetable crops is to scout for nutrient deficiency symptoms and submit tissue samples during the growing season. For recommendations on specific micronutrients needed for crop growth, such as boron, see the [New England Vegetable Management Guide section on micronutrients](#).

Most nutrient applications should be made in spring, when a growing crop is best able to use the applied nutrients and avoid leaching, runoff, or volatilization.

Need further assistance interpreting your soil test results? Contact the soil lab or any of the following Extension Educators:

Vegetables:

UMass Vegetable Program
Phone: (413) 577-3976
Email: umassveg@umass.edu

Cover Crops:

Masoud Hashemi
Phone: (413) 545-1843
Email: masoud@psis.umass.edu

Greenhouse:

Jason Lanier
Phone: (413) 545-2965
Email: jdl@umass.edu

--UMass Vegetable Program

IDENTIFYING POTATO TUBER DISEASES

Early potatoes have been being harvested for some time now, and fields of processing and storage potatoes have been burned down and should be harvested soon. There are many diseases that affect potato tubers, so as you begin to sort through your potato harvest this year, take a moment to check for disease symptoms. Proper identification will help you decide which tubers will store well and which should be sold as tablestock, and will give you a better idea of which soil-borne diseases are present in your fields, improving your future crop rotations. To be sure of a diagnosis, samples can be submitted to the [UMass Plant Diagnostic Lab](#).

Common scab (Bacterial: *Streptomyces* spp.) produces tan to dark brown, circular or irregular lesions, which are rough in texture. Scab may be superficial (russet scab), slightly raised (erumpent scab), or sunken (pitted scab). The type of lesion is dependent on potato cultivar, tuber maturity at infection, organic matter content of soil, strain of the pathogen, and the environment. Common scab is controlled or greatly suppressed at soil pH levels of 5.2 or lower, though a closely related but less common species of *Streptomyces* known as acid scab can survive down to 4.0.

Early blight (Fungal: *Alternaria solani*) usually affects potato foliage but tuber infections can also occur. Tuber lesions are dark, sunken, and circular, and are often bordered by raised, purple to gray tissue. The underlying flesh is dry, leathery, and brown. Lesions can increase in size during storage, causing tubers to become shriveled.



Common scab. Photo: R. W. Samson, Purdue Univ., Bugwood.org



Early blight. Photo: S. Jenson, Cornell Univ., Bugwood.org

Fusarium dry rot (Fungal: *Fusarium* spp.) causes internal, light to dark brown or black dry rot of the potato tuber. The rot may develop at an injury site, such as a bruise or cut. The pathogen penetrates the tuber, often rotting out the center. Extensive rotting causes the tissue to shrink and collapse, usually leaving a dark sunken area on the outside of the tuber and internal cavities.



Dry rot caused by *Fusarium* spp. Photo: C. Averre, Bugwood.org

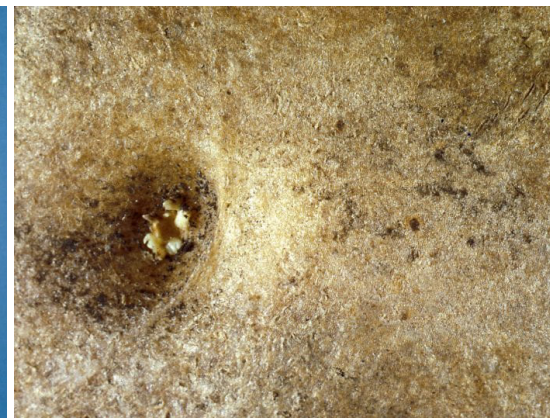


Silver scurf. Photo: UMaine Extension

Silver scurf (Fungal: *Helminthosporium solani*) affects only tuber periderm (skin). Lesions start at the stolon end of the tuber as small, pale brown spots which may be difficult to detect at harvest but will continue to develop in storage. In storage, lesions may darken and the skin may slough off. Many small circular lesions may coalesce to form large affected areas. Tubers may also dry out and become wrinkled due to excessive moisture loss in storage.



Brown-gray discoloration caused by black dot. Black sclerotia are visible with a 10X lens (right). Photos: T. A. Zitter



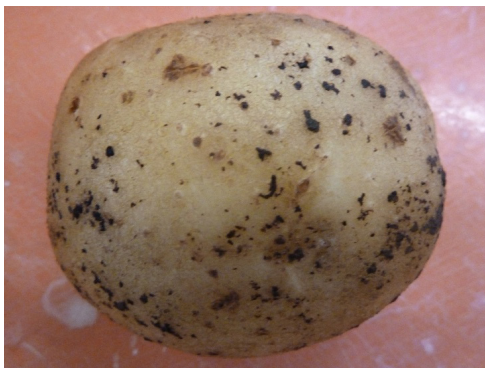
Black dot (Fungal: *Colletotrichum coccodes*): On potato foliage, symptoms of black dot are nearly indistinguishable from early blight. On tubers, it produces large discolored areas that can easily be mistaken for silver scurf. Under a 10X lens, tiny black sclerotia are visible on the surface of the affected tissue.

Black scurf and Rhizoctonia canker (Fungal: *Rhizoctonia solani*): Black scurf is purely cosmetic and does not reduce yield, even in storage. Irregular, hard, black masses that develop on tuber surfaces are overwintering structures (sclerotia) of the fungus. Development of these sclerotia may be minimized by harvesting tubers soon after vine-kill and skin set. While the sclerotia themselves do not cause damage, they allow the pathogen to survive in the soil and serve as evidence of its presence. In cool, wet soils, *R. solani* can cause dark, sunken lesions on underground sprouts and stolons. These lesions can cut off the supply of nutrients and kill tubers, or can reduce the transfer of starches to the tubers, reducing their size. Cankers can also form on the tubers themselves, usually at the stolon or in lenticels. Tuber cankers vary greatly in

size, from small and superficial to large, sunken, and necrotic.

Pink rot (Oomycete: *Phytophthora erythroseptica*):

Pink rot infections start at the stolon end of tubers and result in rotten and discolored periderm with a clear delineation between healthy and diseased tissue. When exposed to air, tuber flesh turns pink and then brown-black.



Black scurf (left, photo: UMass Vegetable Program) and *Rhizoctonia canker* (right, photo: Clemson University, Bugwood.org), both caused by *Rhizoctonia solani*.

Pythium leak (Oomycete:

Pythium spp.): The *Pythium* species that cause leak infections invade tubers through harvest wounds and continue to develop in transit and storage. Infections result in internal watery, gray or brown rot with well-defined red-brown lines delineating healthy and diseased tissue.



Pink rot caused by *Phytophthora erythroseptica*. Photo: Univ. of Minnesota



Pythium leak. Photo: S. B. Johnson

Late blight (Oomycete: *Phytophthora infestans*) affects potato foliage and tubers. Foliar symptoms start with brown to black, water-soaked lesions on leaves and stems, which produce visible white sporulation at the lesion margins under humid conditions. Whole plants and fields may collapse rapidly. Tuber infection is initiated by sporangia from foliage being washed down into the soil and usually begins in wounds, eyes, or lenticels. Lesions are copper brown, red or purplish and white sporulation may occur on tuber surfaces in storage or cull piles. Infected tubers are susceptible to infection by soft rot bacteria, which can turn entire bins of potatoes in storage into a smelly, rotten mass. (Late blight has not been seen in MA since 2017; there has been one isolated case reported in Ontario this year that does not seem to have spread widely.)



Late blight causing water-soaked spots on tubers. Photo: R.W. Samson, Purdue Univ., Bugwood.org.

Potato virus Y can cause necrotic ringspots on tubers, depending on which strain of the virus is present, which potato variety is grown, and the time of infection. Affected tubers have roughened rings of darker brown or reddened skin. Necrosis beneath the rings may extend into the tuber flesh. Necrotic symptoms in tubers often increase after storage. Potato varieties vary in their susceptibility to PVY and the symptoms they exhibit on foliage and on tubers; Yukon Gold is particularly susceptible to tuber necrosis.



Necrotic ringspots on Yukon Gold potatoes caused by PVY. Photo: potatovirus.org

Physiological Disorders

Black heart is caused by lack of oxygen during storage, which causes the tissue to die from the inside out and turn black. The condition is not reversible, but if you notice it quickly and correct your storage conditions you can prevent the whole crop from being affected.

Brown center and **hollow heart** are internal physiological disorders of potato that often occur together. Brown center

is an area of dead pith cells that turn brown, while hollow heart is a star- or lens-shaped hollow area in the center of the tuber. These disorders make fresh-market tubers unat-



Black heart. Photo: North Dakota State Univ.



Hollow heart.

Photo: B. Phillips, Michigan State Univ., Bugwood.org

tractive and can reduce repeat sales. Severe hollow heart negatively impacts the quality of chip-processing potatoes and can result in shipments not making grade. Both disorders are related to stress, and occur at a higher incidence when growing conditions abruptly change during the season. Brown center and hollow heart likely form during tuber initiation but could also form during tuber bulking. If the disorder occurs during the early part of the season, it most often begins as brown center that forms in the stem-end of the tuber, while late-forming hollow heart usually occurs near the bud-end with no brown center symptoms. Conditions such as soil temperatures below 56°F for 5-8 days, or available soil moisture above 80% initiate brown center formation. Incidence of brown center and hollow heart also increases with periods of stress caused by high or low soil moisture, especially if heavy rains occur suddenly after a dry spell. Large tubers are more prone to develop the disorder, so using closer spacing and avoiding skips in the row can reduce incidence of brown center and hollow heart. There are also differences in the susceptibility of potato varieties to both of these disorders.

--Written by Susan B. Scheufele

COVER CROP MIXES - IS MORE BETTER?

--Written by Becky Maden, UVM Extension, & Caleb Goossen, PhD, MOFGA Organic Crop Specialist

We are all familiar with the benefits of combining winter rye with hairy vetch, or oats with field peas: the legume fixes nitrogen, while the grass adds biomass (carbon), suppresses weeds, and acts as a “nurse crop” for the legume, and you get the benefits from both species at the same time. So what happens if you add more species to this mix? Do the benefits multiply?

It’s important to weigh the costs and benefits of a diverse mix of cover crops, especially when you’re considering purchasing pre-mixed, commercial blends that can be quite expensive. There are some obvious benefits to planting a diverse mixture of cover crop species. Namely, if you plant many species, at least one of the species should perform at least okay for you, regardless of the land’s specific conditions and the weather. Another benefit is the opportunity to trial cover crop species that you may not have had the courage to purchase by themselves. These benefits can be achieved with a pre-mixed blend or simply by pouring together whatever leftover seed you have kicking around, planting it, and just witnessing what does well. However, sometimes the benefits of a pre-mixed cover crop “cocktail” may not justify the additional cost, relative to a simple or self-made mix which might meet your needs just as well.

You can consider each cover crop species that you utilize in a mix as an investment, and the benefits that your land and the broader environment receive from each species as your return on that investment. It’s clear to see that moving from zero cover cropping to planting one cover crop species is a huge jump in the benefits to your farm. For example, planting oats alone will reduce soil erosion, add biomass, and provide some weed suppression. Adding a second species with different characteristics will likewise give you an easily noticed return on your investment. For example, adding peas to your oat cover crop will give you the added benefit of nitrogen fixation. However, the peas don’t add much of a benefit in terms of biomass created, because oats produce plenty of biomass on their own.

Adding a third or fourth species can provide other benefits beyond those provided by the peas and oats—for example, tillage radish (aka daikon) will break up soil compaction with its deep tap roots, and buckwheat will establish quickly and

shade out weeds. However, as you add more and more species to your mix, the return on your investment per species becomes smaller and smaller. In other words, the benefits gained by planting a 4-species mix may not be much higher than what you gain by planting a 2-species mix. This is partially because many of the benefits of cover cropping are a result of simply having any plant in the ground (e.g. erosion control, biomass creation, living roots in the soil). Those benefits are fully provided by the first few species planted and the effects do not increase with additional species. Additionally, as you increase the number of species in a mix, each species becomes “diluted”, along with the benefits that that species offers. This declining overall return on investment likely isn’t very noticeable with just 3 species, but **the marginal gains that each new species adds to the overall benefits of your cover crop planting will continue to be harder to observe.** That said, this isn’t meant to discourage anyone from experimenting with or regularly using big, diverse cover crop mixes—have fun with your cover cropping, whatever that means to you!

Cover crop growth period. In terms of planting, there are some fundamentals of establishing the mixtures that you’ll want to follow. Carefully consider **the growth period** for the mix: Is this a multi season mix? Do you need to plant a cash crop early the following spring? Can the subsequent cash crop tolerate high residue? Is your next crop a heavy feeder? Was the field weedy the previous season? Consider staggering the benefits of your cover crop mix. For instance, a summer-planted mix with sorghum sudangrass, Japanese millet, and red clover builds biomass from the grass during the first summer, but once the grasses are mowed and winter-killed, the nitrogen-fixing red clover becomes dominant in the spring. Alternatively, you might choose to plant a mix that matures and is terminated all at the same time, like a fall-planted rye (or wheat, or triticale) and vetch mix. If you are new to cover crop mixes, long rotations are often easiest to play with, giving you more time between cash crops to allow cover crops to become established and for management practices to take place. Long rotations are particularly beneficial when using a mix of short- and long-lived species. Fast-growing annual species establish quickly and can act as a nurse crop for long-lived species that often have small seeds and are slow to establish, provided that the annuals aren’t so competitive that they shade out the longer-lived species.

Seeding rates and depth. For seeding, the general rule of thumb is to keep legume seeding rates the same as if planting them by themselves, but reducing grass seeding rates to 50-75% of their individual seeding rate. Ideally, you would seed each species in the mix at the correct depth for that seed type to ensure good germination rates, but this may be difficult with your equipment or on your scale. You can shoot for the average depth for the species in the mix, or you could split the seed mix into a large seed and small seed batches and make two passes. Another strategy is to seed species in separate, neighboring rows. Very small seeds like clover can even be broadcast before a good rain. Another way to plant cover crop mixes is to temporally separate your seeding dates. For instance, some growers utilize frost seeding (broadcast seeding onto soil that is undergoing freeze-thaw cycles, so that the seed “self-incorporates” into the cracking soil) to



This commercial cover crop mix was comprised of many species, including sunflower, tillage radish, buckwheat, sudangrass, and more. However, the tillage radish dominated (and went to seed!), significantly diluting the effects of the other species.

Photo: C. Goossen



This 3-species mixture of rye, vetch, and tillage radish is more balanced, with no one species dominating.

Photo: K. Campbell-Nelson



This lush red clover stand is a result of seeding oats, peas, and clover in the spring, then mowing the oats and peas at maturity to allow the clover to take over. The fast-growing oats and peas acted as nurse crops to the slow-growing clover, which will now overwinter.

Photo: G. Higgins

establish red clover in a field of winter rye. Once the rye is mature in the spring, it can be harvested for straw, leaving behind an established understory of clover. This clover can provide an incredible amount of nitrogen for a late-summer cash crop. Note that a mix of seed types might self-separate by size, with smaller seeds falling to the bottom, so frequent mixing may be advisable.

So have fun out there—mix it up! If you want to play with simple cover crop mixes, or complicated ones, you can start with MOFGA's [Using Green Manures](#), Penn State's [Making the Most of Mixtures Guide](#) or the great SARE publication [Managing Cover Crops Profitably](#). You can also explore the user-friendly [cover crop decision tools](#) put together by the Northeast Cover Crops Council.

There is a fantastic SARE presentation on cover crop cocktails by Penn State's Mitch Hunter and Charlie White that can be found at: <https://www.sare.org/resources/cover-crop-cocktails/>

NEWS

NORTHEAST SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION (SARE) CALLING FOR 2023 FARMER GRANT PROPOSALS

The Call for 2023 Northeast SARE Farmer Grants is now available. Awards typically range from \$5,000 to \$30,000, depending upon a project's complexity and duration. Northeast SARE Farmer Grants provide the resources farmers need to explore new concepts in sustainable agriculture conducted through experiments, surveys, prototypes, on-farm demonstrations or other research and education techniques. Northeast SARE funds projects in a wide variety of topics, including marketing and business, crop production, raising livestock, aquaculture, social sustainability, climate-smart agriculture practices, urban and Indigenous agriculture and more. The Northeast region includes Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, West Virginia, Vermont, and Washington, D.C.

The online system for submitting proposals will open on Oct 1, 2022. Proposals are due no later than **5:00 p.m. EST on November 15, 2022**. An [informational webinar](#) featuring multiple Farmer Grant recipient Tommye Lou Rafees will take place at 12:00 p.m. on October 4, 2022.

- Learn more about Farmer Grants – northeast.sare.org/farmer
- View the full call for proposals – northeast.sare.org/farmergrantcall
- Register for the webinar – northeast.sare.org/farmergrantwebinar
- View previous SARE Projects – <https://projects.sare.org/search-projects/>

SPOTTED LANTERNFLY FOUND IN HAMPDEN COUNTY

MDAR announced last week that an infestation of the invasive insect known as spotted lanternfly (SLF) was found in the City of Springfield last week. Agricultural inspectors are in the middle of performing surveys in the area in order to determine the extent of the infestation. While MDAR has not been able to determine the origin of this new find, cities like Springfield with large industrial areas are at especially high risk for spotted lanternfly introductions, since this pest can hitchhike on trucks and other methods of transportation that come from infested states. Urban and industrial areas often harbor large populations of the spotted lanternfly's preferred host plant, tree-of-heaven.

MDAR is urging the public to be on the lookout for this pest, especially if they live or work in the Springfield area. Spotted lanternflies may be found on sides of buildings, in or on vehicles, or on host plants, including tree of heaven, grape, maple and walnut. Anyone who has recently received goods or materials from states where SLF is known to have been introduced (including Connecticut, Delaware, Indiana, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, and West Virginia) should also be on the lookout. Additionally, if a spotted lanternfly is found, the public is asked to take a photo or collect the specimen, and report the sighting using MDAR's online reporting form.

The public should look for both adult insects (large, gray bugs, about one inch long, with black spots and red underwings), as well as nymphs (younger, wingless insects that are red with black and white markings). Spotted lanternfly is a sap-feeding insect that has caused significant impacts to vineyards, orchards, and other agricultural commodities in states where it has become established. SLF not only harms grapevines, maples, hops, blueberries, and over 100

other host plants, but has the potential to negatively impact outdoor recreation through the swarming behavior that occurs during mating season.

[Click here for images of SLF life stages.](#)

MDAR LAUNCHES LOCAL FOOD PURCHASE ASSISTANCE COOPERATIVE AGREEMENT PROGRAM (LFPA)

MDAR is soliciting proposals for projects that specifically address the goals of the USDA Local Food Purchase Assistance Cooperative Agreement Program (LFPA). The purpose of this program is to maintain and improve food and agricultural supply chain resiliency.

MDAR is seeking projects to purchase domestic food from local and regional producers, target purchases from Socially Disadvantaged farmers/producers, and distribute food to underserved communities. Preference will be given to applications that demonstrate how relationships and distribution channels will continue past the conclusion of this program. The suggested dollar value of projects is between \$50,000 and \$750,000 and this program does not have a Federal cost sharing or matching requirement. [Click here to watch an informational webinar about the program.](#) You can also [check out an updated FAQ here](#), and [submit additional comments and questions via this form](#).

To apply: Applications are due by 2pm on September 16, 2022, and must be submitted to LFPAGrant@mass.gov

To learn more: [LFPA Program website](#)

To access the Request for Responses: [COMMBUYS - Bid Solicitation](#)

Questions? Applicants may submit questions regarding the RFR and application process. Please submit questions by email to: LFPAGrant@mass.gov.

MDAR NOW ACCEPTING APPLICATIONS FOR THE AG FOOD SAFETY IMPROVEMENT PROGRAM

The goal of the Ag Food Safety Improvement Program (AFSIP) is to support **produce and aquaculture** operations that are looking to upgrade their food safety practices that work towards minimizing the risk of microbial contamination and food-borne illnesses, meet regulatory requirements, and improve market access. AFSIP is a competitive, reimbursement grant program that funds 80% of total project costs up to \$50,000.

Applications are due by 4:00PM on Friday, September 30, 2022. Please refer to the AFSIP website for more information and a copy of the application: www.mass.gov/how-to/agricultural-food-safety-improvement-program-afsip

EVENTS

CONVIVENCIA Y CONVERSACIÓN: TOOLS FOR REDUCING STRESS AND FOSTERING EMOTIONAL WELL-BEING AMONG LATINO FARMWORKERS - REGISTRATION ENDS TODAY!

When: Monday, August 29, 3:00 – 4:00 p.m. ET

Where: Virtual. Link will be sent to participants before event.

Registration: [Register here by Thursday August 25.](#)

From picking vegetables to de-tasseling corn and tending livestock, Latinos comprise the majority of the agricultural workforce in the United States. Oftentimes, as the invisible bodies that produce food enjoyed across the world, Latino farmworkers are isolated physically, culturally, and socially. These workers face many stressors in addition to those common in agriculture like long hours, the weather, or time pressures, including separation from family, limited social and tangible support systems, adjustment to a new culture, communication in a different language, immigration legal concerns and discrimination.

During this webinar, we will discuss common stressors among farmworkers and cultural aspects of coping and resilience, including convivencia and conversación. We will also highlight the Bienvenido (Welcome) program that is working to meet farmworkers where they are at and move toward enhancing emotional well-being, promoting effective communication, reducing mental health stigma, and promoting help-seeking. Presenter Dr. Athena Ramos is an associate professor in the Department of Health Promotion at the University of Nebraska Medical Center (UNMC) in Omaha, Nebraska, and is affiliated with the Central States Center for Agricultural Safety and Health (CS-CASH) and the Center for Reducing Health Disparities.

Contact AgrAbility at 800-825-4264 or email agrability@agrability.org if you have questions.

SOIL HEALTH IN THE FIELD: EARTHWORM SAMPLING AND EARTHWORM INDICATORS

When: Tuesday, August 30, 2022, 9:30am-1pm

Where: UMass Crop & Animal Research & Education Center, 89 River Rd., South Deerfield, MA 01373

Registration: Free! Space is limited. [Click here to register.](#)

Earthworms are a favorite field-indicator of soil health. While you might think all earthworms are created equal, earthworms are categorized based on behavior and location in the soil. Learning to identify the earthworms that we sample can enhance our interpretation of this soil health indicator and give us a better understanding of soil processes. This workshop is lead by entomologist Dr. Olga Kostromytska with UMass Extension and earthworm expert Dr. An-nise Dobson of Yale University. This workshop is appropriate for complete beginners and experienced samplers alike. We will take samples in row crop, hayfield, and forest soils and practice identification using a key, hand lens, and dissecting microscopes. Earthworm types collected from each of the three fields will be compared, and we will discuss how we can use these findings to interpret the soil health. This is a translatable skillset valuable for agricultural service providers, farmers, and scientists.

If you would like to stay for a BYOL picnic (bring your own lunch) please feel welcome to do so. Bring a lawn chair or picnic blanket to sit outside, enjoy the scenery, and chat with soil health minded friends and colleagues. *Coffee and donuts provided in the morning.*

TWILIGHT MEETING AT HARVEST FARM

When: Thursday, September 8, 2022 from 4-6 pm, followed by food and refreshments

Where: Harvest Farm, 125 Long Plain Rd., South Deerfield, MA 01373

Registration: [Click here to register.](#)

Harvest Farm in Whately/South Deerfield will host us for a twilight meeting on the cold chain--keeping produce cold from harvest to market. Chris Callahan from UVM Extension Ag Engineering will join us to talk through harvest strategies, pre-cooling techniques and equipment, and produce storage including cooler maintenance. We'll tour the farm's post-harvest facilities and see the vacuum cooler that Harvest Farm recently purchased with a MA Food Security Infrastructure Grant.

POLLINATOR HEALTH AND DIVERSITY IN THE GARDEN AT GROW FOOD NORTHAMPTON

When: Thursday, September 15, 2022 from 5:30-7:00pm

Where: Grow Food Northampton Community Garden, 140 Meadow St., Northampton MA.

Registration: \$10 per participant. Space is limited, registration required. [Click here to register.](#)

Join us for an interactive workshop about pollinator health and diversity in your garden with UMass Extension and the Western Massachusetts Master Gardeners. We will start with a tour of the Pollinator Garden managed by members of the Western Mass Master Gardener Association. UMass Extension Educator Hannah Whitehead will talk about native bee diversity, and demonstrate a common bee monitoring protocol. Participants will have a chance to practice this technique in different sections of the GFN Community Garden, and we will compare our findings. Space is limited, registration required. [For more info and to register, click here.](#)

SAVE THE DATE - POLLINATOR HABITAT WORKSHOP

When: Thursday, September 22, 2022, 4:30-6:30pm, including food and refreshments

Where: Just Roots Farm, 34 Glenbrook Dr, Greenfield, MA 01301

Come learn about the nuts and bolts of installing pollinator habitat on your farm, including where to find funding and who to contact for assistance. Includes a short presentation and a meet-and-greet with local service providers. Event is hosted in collaboration with CISA, NOFA, Greening Greenfield and Just Roots.

MDAR'S AGRICULTURAL BUSINESS TRAINING PROGRAM – SPOTS STILL AVAILABLE FOR FALL COURSES

Exploring the Small Farm Dream Course

When: Wednesdays, October 5 to November 2, 2022, 6-9pm

Where: Western MA location TBD (tentatively MDAR West Springfield office)

Registration: \$100 for up to 2 participants per enterprise, as space allows. To be considered for the upcoming session, please complete the [brief course application](#) and email it to Jessica.Camp@mass.gov or mail a hard copy to: MDAR, Attn: Jessica Camp, 138 Memorial Ave, Suite 42, West Springfield, MA 01089.

[This 5-session course](#) provides guidance to aspiring farmers through the decision-making process of whether to start a farm business. Participants will learn about the many aspects of starting a farm business, assess their own skills and knowledge, and get help finding resources for support, including marketing, financing, and regulations. The Exploring the Small Farm Dream course utilizes the curriculum and workbook developed by the New England Small Farm Institute. Through four guided group sessions and a farmer panel session, participants will analyze the feasibility of their small farm dream and clarify their vision together with other class participants. This course is sponsored and financially supported by the Massachusetts Department of Agricultural Resources and is intended for new agricultural entrepreneurs intended to start their farm business in Massachusetts.

*Plans are for an in-person class with the location to be determined based on interest from those who submit an application and are added to the waiting list. For more information (including a more detailed course description), see the ABTP [program webpage](#) or contact Jess Camp at 617-823-0871.

Growing Your Farm Business Planning Course

When: Tuesdays, October 11 – November 29, 2022, 5:30-8:30pm

Where: MDAR Southborough office, 225 Turnpike Rd, Southborough, MA 01772

Registration: \$150 per farm. If interested, please complete the brief [course application](#) and email it to Diego.Irizarry-Gerould@mass.gov or mail a hard copy to: MDAR, Attn: Diego Irizarry-Gerould, 138 Memorial Ave, Suite 42, West Springfield, MA 01089.

A hands-on course to help established farmers develop a business plan and financial projections for their farm business. This course covers topics including resource assessment, marketing strategy, financial management, risk management, quality of life, and goal setting. The course is taught by a professional business planner with years of experience working with Massachusetts farms and guest speakers on topics such as succession planning and online marketing. Enrollment is open to farmers who have been operating a farm business in Massachusetts for at least the two prior years. Eight weekly classes will be held on Tuesday evenings starting October 11 and ending November 29. The course fee, subsidized by MDAR, is \$150 per farm.

The Growing Your Farm business planning course has been approved as a certified USDA Farm Service Agency (FSA) borrower training for financial management. For more information, or to access a Growing your Farm application to sign up for the upcoming session, please see the ABTP [program webpage](#) or contact Diego Irizarry-Gerould at 857-248-1671.

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Vegetable Notes. Genevieve Higgins, Lisa McKeag, 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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