



UMass  
Extension

# Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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## IN THIS ISSUE:

- Crop Conditions
- Pest Alerts
- Pumpkin & Winter Squash Harvest, Curing, and Storage
- Late-season Cover Crops
- Fungal Leaf Diseases of Tomato
- News
- Events
- Sponsors

## CROP CONDITIONS

The heat wave finally broke this week, and it has suddenly felt like fall, with cool mornings and warm sunny days. It's still summer, though—later successions of summer squash, zucchini, and cucumber are still rolling in, along with tomatoes, melons, eggplants, peppers, and sweet corn. Folks are starting to harvest potatoes, and have begun to clean up last month's garlic harvest for wholesale and seed, clearing up valuable space for curing onions. Farms that rely on high school and college students for labor are starting to lose workers as the beginning of the school year approaches. This coincides with those bulk onion and potato harvests and potentially early winter squash harvests (see below), and we're starting to see fall hiring announcements.

And it's still incredibly dry; it's hard to replicate normal, sufficient rainfall with irrigation for this long. Crops are showing signs of drought stress like early, short fruiting periods, misshapen fruit, stunted plants, and leaf wilting or scorch, and dieback. Nine MA counties were just designated by the USDA as primary natural disaster areas, and three additional counties were designated as contiguous natural disaster areas, due to the drought. This means that growers in all MA counties except for Berkshire Co. will be considered for FSA assistance, including disaster relief loans. For more information, visit the [FSA Disaster Assistance Programs](#) website.

Growers are wondering what to do with winter squash and pumpkins that have matured early due to drought, and/or in fields with significant foliage loss due to powdery mildew. Generally, if the foliage of a squash crop has gone down, the quality of the fruit will not continue to improve. In fact, the lack of foliage puts the fruit at risk of sunburn and increased chances of feeding damage from things like deer. See the article in this issue about timing for squash and pumpkin harvest and optimal storage conditions that will help to help keep them as long as possible into the fall. We get lots of questions about optimal storage temperatures for a variety of crops. [USDA Handbook 66 - The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks](#) - is where we always look for these answers and a great resource in general for growers.



*The view from the tractor of our squash trial and our research sprayer last week! We are collaborating with AgZen, an ag tech company started by MIT graduates, to evaluate a pesticide spray additive to improve coverage with the hopes of being able to reduce pesticide rates.*

*Photo: S. B. Scheufele*

## 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](mailto:umassveg@umass.edu)

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

## PEST ALERTS

### Alliums

Keep an eye out for symptoms of bulb rots and [garlic bloat nematode](#) as you begin to sort garlic for seed. Degrading basal plates with few roots, wrappers sloughing off, and fluffy pink growth between cloves are some things to keep an eye out for. See Culling Garlic: Don't Plant or Store Infected Bulbs in the [October 7, 2021 issue of Veg Notes](#) for more symptoms to look out for.

### Brassicas

Damage from all the usual suspects is likely widespread in brassica fields right now – [caterpillars](#), [flea beetles](#), [Alternaria leaf spot](#), [black rot](#).

**Swede midge:** Significant swede midge damage was reported in far north-eastern NY this week, in a field that received limited chemical treatment. We have seen suspected cases of this pest in MA but not significant, widespread damage—it doesn't seem to be spreading rapidly southward from northern ME and NY. Swede midge is a tiny fly that lays eggs in the growing point of brassica plants. The resulting larvae are near invisible to the naked eye; they feed on the growing point then drop to the soil to pupate. The damage is often not apparent until after the pest is in the soil pupating. Damage includes distorted growing points, multiple growing points, no growing points at all (a symptom called blind heads), and scarring on leaf petioles. MA commercial growers: If you see significant damage like this in your fall brassicas, let us know at [umassveg@umass.edu](mailto:umassveg@umass.edu). For more information on management and pictures of symptoms, see the article in the [February 20, 2020 issue of Veg Notes](#).

**Cabbage root maggot:** The 4<sup>th</sup> generation of larvae is causing damage in fall brassica crops now. Damage includes wilting, leaf discoloration, and plant death in leafy and heading crops and tunneling in root crops. This generation will overwinter as pupae and re-emerge as adults next spring. Plan to rotate spring brassica crops far from fields that are heavily infested this fall. Soil drenches of Coragen, Verimark, Radiant, and Entrust (heading and leafy brassicas only) can control CRM if applied when eggs are first seen at the base of plants. Once larvae have been feeding in roots for several weeks, chemical control is difficult. If a root crop has been rendered completely unmarketable, tilling it under will reduce the number of flies emerging from that field next spring.

### Chenopods

**Edema** was diagnosed in Maine on chard stems this week. We also see this regularly in MA. This appears as elongate (sometimes called spindle- or boat-shaped) ruptures on the midrib of the leaves. Edema occurs when a plant is taking up water from the roots faster than the water can evaporate out of the leaves. It most commonly occurs in waterlogged soils during



*Cabbage root maggot tunneling in hakurei turnip.*



*Edema on chard stems. Photo: M. Munster*

Location	Captures
Whately	0
Leominster	3
Sharon	1
Southampton	0

periods of low light, which triggers stomata to stay closed, or high humidity, which slows the rate that water can evaporate from leaves. These are generally *not* the field conditions we've seen this year, but high humidity a few weeks ago could have triggered this.

### Cucurbits

The same persistent pests are present in cucurbits: [squash bugs](#), [striped cucumber beetle](#), [bacterial wilt](#), [powdery mildew](#), [downy mildew](#) in cucumbers and cantaloupe (the nearest reports of DM in pumpkin is in northwestern Ohio, acorn squash in South Carolina and butternut in Tennessee, and risk of disease development in non-cucumber or melon crops is low).

**Viruses** are being reported in cucurbits across the state. There are several viruses of cucurbit

crops and symptoms can vary widely, but some common symptoms are mosaic patterns (irregular, crinkly discoloration) on leaves, discolored, lumpy fruit, malformed, skinny leaves, and stunting. Most cucurbit viruses are vectored by several species of aphids but controlling aphids using chemical controls can exacerbate the disease by irritating the aphids and increasing their movement, resulting in faster spread of the virus. For more information on viruses of cucurbits, see the article in [last week's issue of Veg Notes](#).

### Nightshades

We're hearing reports of [two-spotted spider mites](#) in solanaceous crops. Mite populations tend to grow rapidly in hot, dry conditions. In greenhouses or high tunnels, predatory mites can be released for biocontrol - *Phytoseiulus persimilis* and *Amblyseius californicus* are two species. High levels of infestation are hard to control with insecticides, but if caught early, mite-selective products including Agri-Mek, Acramite, Movento, Oberon 2SC, Kanemite, and Portal XLO have shown efficacy.. OMRI-listed materials include insecticidal soap (e.g. M-Pede) and horticultural oils (e.g. Trilogy, Suffoil X, Golden Pest Spray Oil don't use when temperatures are high or plants are drought-stressed).

### Sweet corn

[Corn earworm](#) trap counts are up this week, with a high of 188 from Seekonk, putting most sites on a 4 day spray schedule. [Fall armyworm](#) numbers are low. If you are seeing lots of ragged FAW feeding damage in whorl-stage corn, scout younger corn for windowpane feeding damage that goes through all but the lower-most layer of the leaf

Location	GDD <sup>1</sup> (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
<b>Western MA</b>						
Deerfield	2057	0	0	0	38	4 days
Feeding Hills	2135	2	2	0	22	4 days
Granby	2069	14	0	0	17	4 days
Whately	2135	1	0	14	36	4 days
<b>Central MA</b>						
Leominster	2041	3	0	0	-	-
North Grafton	1878	10	0	0	17	4 days
Sutton		4	1	1	5	5 days
Spencer	1974	3	0	0	13	4 days
<b>Eastern MA</b>						
Bolton	2056	0	1	2	26	4 days
Concord	1853	3	0	1	18	4 days
Haverhill*	2150	12	0	3	22	4 days
Ipswich*	1919	14	0	0	22	4 days
Littleton	-	6	0	0	16	4 days
Millis	-	12	4	n/a	38	4 days
North Easton	2083	-	-	-	21	4 days
Sharon		2	0	0	164	3 days
Sherborn	2111	6	1	1	14	4 days
Seekonk	2306	0	0	6	188	3 days
Swansea		3	-	3	19	4 days
- no numbers reported for this trap						
N/A this site does not trap for this pest						
<sup>1</sup> GDDs are reported from the nearest weather station to the trapping site						
*Trap counts are from the previous week						

tissue; if more than 12% of plants are infested with FAW or ECB, an early spray may be warranted, to kill FAW before they move down into the whorl. [European corn borer](#) numbers remain relatively low, with most locations trapping 0-3 moths, and we can expect them to remain low for the remainder of the sweet corn season.

Growers who have experienced sweet corn crop losses due to the drought should reach out to their insurance agents sooner rather than later to begin claims.

## **PUMPKIN & WINTER SQUASH HARVEST, CURING & STORAGE**

With the hot dry weather we've been having, many pumpkins and winter squash are maturing earlier than usual in the field, and harvest is on the horizon. Correct harvest timing, curing and storage conditions can significantly affect eating quality, storage length and post-harvest disease.

**Harvest Timing for Winter Squash and Pie Pumpkins:** For winter squash and pie pumpkins, harvest timing determines the flavor and texture of the fruit. As squash fruits grow, they accumulate starch, which is then converted into sugar in the field and during storage. The balance of starch (texture) and sugar (sweetness) in a squash determines the eating quality. Squash is mature when seeds are completely filled. If squash is harvested before it is mature, the fruit will use starch reserves from the flesh to fill the seeds, resulting in poor flesh quality. Immature squash will also not have enough starch to convert into sugar later on.

Most squash varieties are mature and ready to harvest 50-55 days after fruit set, or days after pollination (DAP), although in a hot, dry year like this year, this time can be shorter. In many varieties, this is many weeks after the fruit turns a marketable color, which can be misleading. Dr. Brent Loy, late researcher emeritus at the NH Ag Experiment Station, said that days to maturity listed in seed catalogs are often incorrect, especially for acorn squash; catalogs often state 70-76 days to maturity (from time of seeding) when in reality it's more like 90-100 days to maturity. It's not necessarily easy to keep track of fruit set, so there are some other indicators that squash is ready for harvest—see the end of this article for more information about specific types of squash.

**Harvest Timing for Pumpkins:** Since the pumpkin market lasts from Labor Day to Halloween, pumpkins may need to be held for several weeks before they can be sold. One factor in deciding when to harvest is the condition of the vines. Intact foliage protects fruit from the sun, and when vines and foliage die down from powdery or downy mildew, fruit can get sunscald. There are two types of cucurbit downy mildew, and only one affects pumpkin. So far this year, downy mildew on pumpkin has not been reported in the Northeast. However, powdery mildew is widespread. Foliar diseases, especially powdery mildew, can also reduce the quality of pumpkin handles, leading to reduced marketability for jack-o-lantern pumpkins. As September approaches, the other major factor in deciding when to harvest is avoiding chilling injury. Chilling hours accumulate when squash or pumpkins are exposed to temperatures below 50°F in the field or in storage. Injury increases as temperature decreases and/or length of chilling time increases. This is particularly important for squash headed into long-term storage.

There can be extra work involved in bringing fruit in early and finding good storage locations, especially for growers who normally have pick-your-own harvest. Ideally, pumpkins would be harvested as soon as crops are mature and stored under proper conditions. Proper curing and storage conditions are key for pumpkins in particular, because improper conditions can result in handles shrinking and shriveling, making the pumpkins unmarketable. If you need to hold fruit in the field for pick-your-own or any other reason, using a protectant fungicide (e.g. sulfur, oil, or chlorothalonil) along with one of the targeted powdery mildew products can help protect from black rot, powdery mildew, and other fungal fruit rots. For information on identifying and controlling fungal fruit rots of winter squash, see the [September 3, 2020 issue of Veg Notes](#). Scout for insects feeding on the fruit and handles, which may include squash bug nymphs and adults and striped cucumber beetles, and control them if damage is evident. See the [Pumpkin, Squash, & Gourds insect control section](#) of the New England Vegetable Management Guide for treatment recommendations.

**Harvest:** Despite their tough appearance, squash and pumpkin fruit are easily damaged. It is important to avoid bruising or cutting the skin during harvest. Once the rind is bruised or punctured, decay organisms will invade the fruit and quickly break it down. Place fruit gently in containers and move bins on pallets. Use gloves to protect both the fruit and the workers. For some squash, especially butternut, stems can be removed to prevent them from puncturing adjacent fruit during harvest and storage. If stems are removed, allow the stem scars to heal before putting into storage (see Curing below).

**Curing:** For some squash types (e.g. acorn and delicata), the mature fruit can be eaten immediately after harvest. Other squash types (e.g. butternut, hubbard, kabocha), need time to convert starches to sugars and must be cured or stored for a specific amount of time before they are eaten.

Curing speeds up the conversion of starches to sugars so that squashes reach optimum eating quality sooner. It also causes fruit skin to harden and accelerates wound healing to prevent disease development. *P. maxima* and *moschata* squash varieties can be cured to hasten market readiness. However, curing is not always necessary: if you are planning to store squash for a few months before selling, and the fruit is free of wounds, it should have sufficient time to convert starches to sugars and can go directly into storage conditions without the extra boost. *P. pepo* squash types are ready to eat at harvest (if harvested when mature!) and curing can actually reduce their storage lifespan.



*Butternut squash curing in a high tunnel*

To cure squash, store it for a short period of time (5-10 days) at a high temperature (80-85°F) and 80-85% relative humidity immediately after harvest. This can take place in the field if weather allows (night temperatures should not drop below 60°F), or in a well-ventilated barn, greenhouse, or high tunnel.

**Storage:** Pumpkins and winter squash should be stored in a cool, dry, well-ventilated area. Store fruit at 50-60°F with 50-70% relative humidity. Chilling injury is possible at temperatures below 50°F, and long-term storage at temperatures above 60°F will result in weight loss due to increased respiration rates. Large fluctuations in temperature favor condensation on fruit within the bin, which encourages disease. Therefore, fruit temperature should be kept as close to the temperature of the air as possible to avoid condensation and fruit rot. Relative humidity above 70% provides a favorable environment for fungal and bacterial decay organisms, and relative humidity below 50% can cause dehydration and weight loss. In a greenhouse, temperature can be managed with ventilation on sunny days; heaters will be needed for storage into November and beyond. An inner curtain can reduce heat loss and cost.

Storage life depends on the condition of the crop when it comes in and your ability to provide careful handling and a proper storage environment. All fruit placed in storage should be free of disease, decay, insects, and unhealed wounds. See the end of this article for maximum storage times for different types of squash. Fruit that has been exposed to chilling temperatures (below 50°F) will not store well and should be marketed first.

Few farms have the infrastructure to provide ideal postharvest conditions for all of their fall crops. Fortunately, finding a method that is 'good enough' often does the job. Even if it is difficult to provide the ideal conditions, storage in a shady, dry location, with fruit off the ground or the floor, is preferable to leaving fruit out in the field.

#### **Harvest timing and storage needs for different squash types:**

***Cucurbita pepo* (acorn, delicata, sweet dumpling, some pie pumpkins):** Acorn squash turns dark green 2-3 weeks after fruit set, which is 40-50 days *before* it should be harvested. Because acorn squash *can* be marketed as soon as it turns dark green, regardless of eating quality, many acorn varieties will never accumulate enough starch and will therefore never be sweet. The variety 'Honey Bear' was developed by UNH and has high sugar content at harvest. Harvest *C. pepo* squashes when the 'ground spot' (the part of the squash that lays on the ground) is dark orange. Pie pumpkins should be harvested when the skin is fully orange. These varieties can be eaten at harvest and will store for 2-3 months. They should not be cured, because it can reduce their lifespan in storage.

***Cucurbita maxima* (kabocha, hubbard, buttercup):** Stems becomes dry and corky when the fruit is ready to be harvested. These are more susceptible than other squash to sunburn and so if vines go down from disease, they should be harvested early (40 DAP), cured, then stored at 70-75°F for 10-20 days to achieve acceptable eating quality. These have high starch content at harvest and so need to be stored for 1-2 months before being eaten, with the exception of all mini-kabochas and all red-skinned kabochas, which can be eaten at harvest. They will store for 4-6 months.

***Cucurbita moschata* (butternut, some edible pumpkins):** Butternut will turn tan 45 DAP but should not be harvested for another 2 weeks. Mini-butternut can be eaten at harvest and will store for 3 months. All others should be stored 1-2 months before eating to allow for starches to be converted into sugars and will store for 4-6 months. Carotenoid, the pigment that gives squash its yellow/orange color, also increases in storage for these squash, giving them more color and making them more nutritious.

**Additional information:**

- [Eating Quality in Winter Squash and Edible Pumpkins](#)
- [Maximizing Yield and Eating Quality in Winter Squash - A Grower's Paradox](#)
- [Managing Winter Squash for Fruit Quality and Storage](#)

--Written by G. Higgins and R. Hazzard, compiled 2018 from resources by Brent Loy, late researcher emeritus, New Hampshire Agricultural Experiment Station and professor emeritus of genetics, UNH.

## **LATE-SEASON COVER CROPS**

There are many reasons to plant a late season cover crop. They increase organic matter, improve soil structure, scavenge remaining nutrients, choke out weeds, and prevent soil erosion. There are several types of grasses, legumes and brassicas that work well as winter cover crops, and each have their own strengths and weaknesses. Below we've described several good choices, depending on your specific goals and field conditions. We've noticed that the fall planting window has extended, in some cases into November(!), though many of these species do best when planted in late summer or early fall (see individual entries below for more details).

**GRASSES** can reduce erosion and return a significant portion of organic matter and other nutrients to the soil if planted after removing a seasonal crop and if given enough time to mature. Kill grasses before maturity in the spring to ensure efficient decomposition. Mix grass species with a legume to reduce the C:N ratio and supply more nitrogen for the following year's crop, or with any broadleaf species to increase weed suppression.

**Annual or Italian ryegrass (*Lolium multiflorum*) and perennial ryegrass (*Lolium perenne*)** are gaining popularity with some growers because of increasing availability of commercial varieties such as 'Fria Annual Rye'. These grasses have dense root systems that outcompete weeds, protect against erosion, and are easy to incorporate in the spring. Annual ryegrass can tolerate some flooding. Perennial ryegrass is more cold-hardy but also harder to kill if it goes to seed. Both are shade tolerant but may not germinate very well under dry conditions. Plant 6-8 weeks before the fall frost date. The seed is small and light, so specialized equipment such as a Brillion seeder is needed to seed a large area. **Seeding rate:** 20-30 lbs/A broadcast; 10-20 lbs/A drilled; 8-15 lbs/A mixed with a legume.

**Winter or cereal rye (*Secale cereale*)** is the most common cover crop used by growers in Massachusetts. It is inexpensive, easy to get and to establish, and can be seeded up until 2 weeks before a killing frost. However, it is best planted before September 15<sup>th</sup> in order to recover the available N from the soil and produce enough canopy to outcompete weeds and protect the soil from erosion. It consistently overwinters here and will continue to grow in the spring, producing up to 7,000 lbs/A of biomass contributing to soil organic matter. It should be seeded with a legume to keep the C:N ratio low, making more N available in the spring. It can take several weeks and multiple tillage passes to break down in the spring; some growers are hesitant to use this cover crop because of the longer decomposition rate and allelopathic effects on direct-seeded spring crops. **Seeding rate:** 90-120 lbs/A broadcast; 60-120 lbs/A drilled; 50-60 lbs/A mixed with a legume.

**Winter wheat (*Triticum aestivum*)** is increasingly being used as a cereal grain and as a cover crop. It is winter hardy, but does not grow as tall or mature as quickly as rye so there is no rush to kill it in early spring and risk compacting wet soils. Wheat is excellent for erosion control, scavenging N, P, and K, building soil organic matter, and improving tilth. For best results, plant it in late-summer to early-fall, before September 15<sup>th</sup>. Best growth will be in well-drained soils with moderate fertility. Rye is a better choice on wet soils. Wheat works well as a nurse crop for legumes such as hairy vetch, clover, or peas. **Seeding rate:** 90-160 lbs/A broadcast; 60-120 lbs/A drilled; 60-90 lbs/A mixed with a legume.

**Triticale (*x Triticosecale*)** is a hybrid between wheat and rye. It can be seeded as early as August and can produce more fall growth than winter wheat, providing more weed suppression and erosion control. **Seeding rate:** 90-100

lbs/A broadcast; 75-80 lbs/A drilled; 60-90 lbs/A mixed with a legume.

**Oats (*Avena sativa*)** come up quickly and can be seeded in the late-summer. It is best planted before September 15<sup>th</sup>, similar to winter rye. Unlike winter rye, oats will winterkill in Massachusetts, making for simpler field preparation in the spring. However, oats provide less weed control and lower organic matter contribution. To maximize nitrogen carry-over to the following crop, mix with a legume that will overwinter such as hairy vetch. **Seeding rate:** 110-140 lbs/A broadcast; 80-110 lbs/A drilled; 60-90 lbs/A mixed with a legume.



*Oats and peas*

**LEGUMES** are a good choice if you are interested in adding nitrogen to the soil and reducing nitrogen fertility bill. Before planting, it is important to inoculate seed with the appropriate root-nodulating bacteria that will fix nitrogen from the air. Some growers use Coca-Cola or sugar water to help the inoculum stick to the seed; plant while the seed is still wet to keep the bacteria alive. There are several bacterial inoculants that are each specific to certain legumes and therefore must be used with the correct plant groups in order to establish. If well-managed, legume cover crops can provide as much as 100-150 lbs N per acre to the following crop. Imagine the fertilizer cost savings!

**Hairy vetch (*Vicia villosa*)** usually benefits from growing with a nurse crop such as rye, oats, or wheat to help reduce matting during the spring and to keep weeds down. The vetch and the grain can be mixed together in the seed drill or broadcast seeder. A vetch + grass cover crop mixture retains more soil moisture than a grass planted alone. In the spring, incorporate vetch at early bloom, typically in late-May. If the vetch is planted in late-July or early-August, it is less likely to survive the winter, which can be a good thing if you've ever struggled with vetch that has re-seeded itself. With a good flail mower, vetch can be used in a reduced tillage system without matting and tangling in the equipment. **Seeding rate:** 25-40 lbs/A broadcast; 15-40 lbs/A drilled, 15-20 lbs/A mixed with a grass.

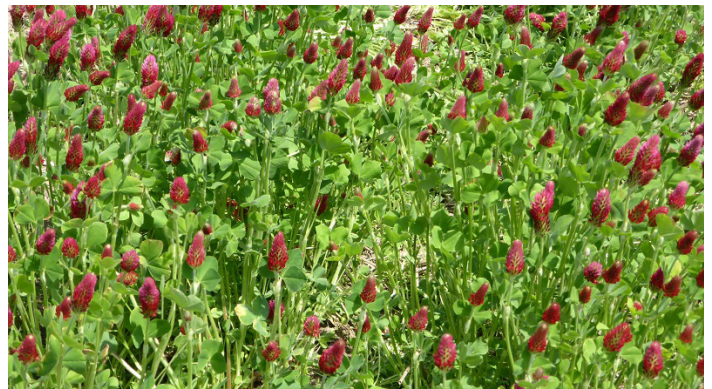


*Rye and vetch.*

*Photo: K. Campbell-Nelson*

**Red clover (*Trifolium pratense*)** is a short-lived perennial that is somewhat tolerant of soil acidity and poor drainage. Mammoth red clover produces more biomass for plow-down than medium red clover, but does not regrow as well after mowing. Mammoth will often establish better than medium red clover in dry or acid soils. Sow in early-spring or late-summer. Red clover can be undersown in mid-summer into corn or winter squash before it vines, and into other crops such as fall brassicas if soil moisture is plentiful. Clovers germinate and grow slowly and so can be planted along with a faster-growing grass and/or peas as a nurse crop. Clovers are a good option to include in a field that won't be planted into a cash crop for a full year or more. **Seeding rate:** 10-15 lbs/A broadcast; 6-15 lbs/A drilled; 6-10 lbs/A mixed with a grass.

**Crimson clover (*Trifolium incarnatum*)** grown as a winter annual should be seeded early-August to early-September in New England; seed it too early and it will make seeds in the fall and won't re-grow until spring soils warm up. While it grows well in dry conditions, it may have trouble germinating. This clover is a better fall weed suppressor than hairy vetch. This crop is easily killed by incorporation or can even be rolled or mowed in the spring at late-bloom stage for no-till operations. See notes above in the red clover section about germination speed. **Seeding rate:** 22-30 lbs/A (15-20 lbs/A in a mixture) broadcast; 15-18 lb/A (10-12 lbs/A in a mixture) drilled.



*Crimson clover. Photo: K. Campbell-Nelson*

**Field pea (*Pisum sativum* subsp. *arvense*)** also known as Austrian winter peas (black peas) or Canadian field peas

(spring peas) should be planted mid-August to mid-September in much of New England. These peas fix nitrogen more quickly in dry conditions than white clover, crimson clover, or hairy vetch. Field peas are susceptible to *Sclerotinia* so don't plant them in a field with a history of white mold. Drill or incorporate seed 1-3 inches deep to ensure good soil moisture contact. **Seeding rate:** 80-120 lbs/A broadcast; 75-100 lbs/A drilled; 60-80 lbs/A in a mix.

**BRASSICAS** are used as cover crops for pest management or, in the case of the tillage radish, for improving water drainage and soil structure. Brassica cover crop species are susceptible to the same pests as brassica cash crops, so be sure to factor in any brassica cover crops that you plant when planning crop rotations for pest management.

**Tillage radish (*Raphanus sativus*)** is also known as daikon, forage, or oilseed radish. They act as biological subsoilers as their taproots can grow to 8-14 inches long. With its deep roots, this cover crop can recover N, P, S, Ca, and B for the following season, but a cash crop must be planted early in the spring or else these nutrients are lost through fast decomposition and the deep root holes. Best planted in late-August, this cover crop typically winterkills in November or December. A unique no-till strategy with forage radish includes seeding it in the late summer along with cover crop mixtures on 6-ft. centered beds, then in the spring, place transplant plugs directly in the holes where the radishes grew. This cover crop releases most of its harvested N by May, unless seeded with a grass such as oats. Higher seeding rates are effective for weed management, while lower seeding rates are better for breaking compaction. **Seeding rate:** 10-13 lbs/A broadcast; 7-10lbs/A drilled; 5-8 lbs/A in a mixture.

**Brown mustard (*Brassica juncea*)** found in many of the 'Caliente' seed mixes is a biofumigant planted to combat root-knot nematode and a variety of soil-borne fungal pathogens, including *Fusarium*, *Verticillium*, *Rhizoctonia*, *Pythium*, and *Phytophthora capsici*. It is also allelopathic against weeds. If allowed to flower, this crop is highly attractive to honey bees. Successful biofumigation with this cover crop is achieved by following these steps: 1) Apply adequate fertility (50 lbs N/A and 20 lbs S/A); 2) allow it to flower before incorporation; 3) mow, disc, or rototill under, and roll or pack the soil immediately; 6) irrigate after incorporation or incorporate before rain to enhance fumigation. Plant brown mustard in late-August through September. Other brassica cover crops include rapeseed or canola and turnips, which are often used as livestock forage. **Seeding rate:** 10-15lbs/A broadcast; 8-12 lbs/A drilled.



*Flowering mustard crop*

It is always better to plant a cover crop, regardless of the type, than leave a field bare; leaving a field bare over the winter is very damaging to soil structure, increasing erosion and reducing long-term fertility. Though it may take several growing seasons or a lifetime to perfect the art of cover cropping, your soil will thank you.

#### **Resources:**

- Northeast Cover Crops Council [Cover Crop Explorer](#) and [Species Selector Tool](#)
- [A Comprehensive Guide to Cover Crop Species Used in the Northeast United States](#). Prepared by USDA-NRCS.
- [Managing Cover Crops Profitably](#). 3rd ed. Published by the Sustainable Agriculture Network, Beltsville, MD.
- [Cover Crop Plant Guides](#) prepared for USDA by NRCS, RMA and FSA.
- [Cover Crop Chart](#) prepared by USDA-ARS.

--Compiled by Katie Campbell-Nelson. Adapted from work by R. Hazzard & F. Mangan, UMass, Vern Grubinger, UVM and Thomas Bjorkman, Cornell. Reviewed by Julie Fine, 2016.

## **FUNGAL LEAF DISEASES OF TOMATO**

Under the incredibly dry conditions this year, it is especially discouraging to see tomato plantings still going down to foliar diseases. While most of the fungal foliar diseases of tomatoes thrive and spread mostly quickly in rainy weather,



they can infect and spread using just the moisture on leaves formed by overnight dew. During the recent heat wave, humidity was high, and dew formed on leaves early in the evening and remained late into the morning, giving these foliar diseases a leg up. At this point in the season, field tomatoes have been being harvested for almost a month, and it's likely too late to control severe infections of these foliar diseases. Take some time to identify what diseases you have in your field and high tunnel tomato crops this year, though, so that you can make a plan for control for next year.

Most of the diseases caused by these pathogens can occur in both field and high tunnel tomatoes, but Botrytis, leaf mold, and powdery mildew are most commonly seen in high tunnels and Septoria and early blight are most commonly seen in the field. Late blight, which we haven't seen in MA since 2017, is often perceived as the scariest tomato disease because of its ability to rapidly wipe out a crop; however, the diseases outlined below, which we see every year without fail, routinely have significant effects on fruit quality and yield. (So far this year, late blight has been reported only in two counties in Florida and in an isolated farm in Ottawa County, Ontario. At this point in the season, even the Ontario case does not pose a significant, immediate threat to MA tomatoes or potatoes.) Even though we don't expect to see late blight in MA this year, some key characteristics of late blight **are listed below** in order to help you distinguish them from symptoms of the other diseases included in this article.

- Leaf lesions are dark-green to gray, and appear water-soaked or greasy.
- No leaf yellowing occurs.
- Stem lesions are brown and can occur anywhere on stems or petioles.
- White sporulation may be seen within or on the edges of lesions on leaves or stems.
- Lesions can occur anywhere on the leaf and anywhere on the plant, meaning that they don't necessarily start at leaf margins or at the base of the plant but are distributed throughout the canopy.



*Late blight lesion on tomato*

The common fungal foliar diseases of tomato are similar in that they all thrive in hot, humid weather and once established, are spread by wind, splashing water, insects, workers, and equipment. Most also survive in infested crop residue or in the soil. It's common to see multiple of these diseases on a single plant. Management practices are similar for all of these diseases, but it is still helpful to know what diseases you are seeing in your crop so you know where it is coming from and how to stop its spread. It's especially important to identify what diseases you have if you plan to control them using resistant varieties. For help with tomato disease identification, you can send us photos at [umassveg@umass.edu](mailto:umassveg@umass.edu), or submit samples to the [UMass Plant Diagnostic Lab](#).

**Botrytis gray mold & ghost spot (*Botrytis cinerea*):**

*Botrytis cinerea* causes leaf spots, stem cankers, fruit rot, and ghost spot on fruit. The pathogen thrives in humid greenhouse conditions, but it has been observed in field tomatoes when humidity is very high. Leaf lesions are dark gray and have no yellow halo, and therefore are often mistaken for late blight lesions. Under conditions of alternating heat and humidity, like in a high tunnel, the pathogen grows in such a way as to form concentric rings, and for this reason can also be confused with early blight. The way to distinguish Botrytis from early blight is by its characteristic fuzzy, brownish-gray sporulation. If you hold the leaf up and look across the lesion horizontally, you will see fine mycelia sticking up with little tuftlets on the ends that resemble grape clusters. *B. cinerea* primarily feeds on dead tissue and is only weakly pathogenic, therefore, you will



*Botrytis in tomato. Clockwise from top left: Characteristic concentric rings of leaf spots (Photo: S. B. Scheufele). Fuzzy gray sporulation (Photo: G. Higgins). Ghost spot on fruit (Photo: G. Higgins).*



likely see this sporulation on senescing tissue including flowers, pruning scars, or leaf tips and margins where nutritional disorders have caused tip dieback. Spores that land on fruit cause ghost spot, which appears as pale white haloes or ring spots on the green fruit. On ripe fruit, the ringspots may be yellow. Ghost spot develops when the fungus initiates infection, but disease progress is stopped by dry environmental conditions. This spotting may adversely affect market quality. Under more humid conditions, ghost spot may lead to fruit rot. *B. cinerea* has a wide host range and can survive on dead plant tissue for long periods of time. It overwinters as mycelium in crop residues and sometimes as sclerotia in the soil.



**Leaf mold (*Passalora fulva*, previously *Fulvia fulva*):**

This disease is quite common in tunnels and greenhouses, in both soilless and hydroponic systems. Leaf mold infections begin on older leaves and cause pale-green to yellow spots visible on the upper leaf surface, with olive-green to grayish-brown fuzzy sporulation on the underside of the leaf. Heavily infected leaves turn yellow, then brown, and may wither and drop. Occasionally petioles, stems, and fruit may be affected. Infected flowers wither without setting fruit and infected fruit has leathery, black, irregularly shaped lesions. The fungus overwinters in soil on crop residue and as sclerotia (hard, black, long-lived resting structures) and may be introduced on infested seed. The fungus can survive and reproduce between 50-95°F, with optimal infection and growth between 71-75°F.

*Leaf mold: Yellow spots appear on the tops of leaves (left) and produce fuzzy olive green sporulation on undersides of leaves (right). Photos: Cornell Coop. Extension*

**Powdery mildew (*Oidium neolyopersici*)** of tomato is primarily a concern in high tunnels. (Note: this is a different pathogen than the one that causes powdery mildew on cucurbits.) Infections begin as small, white, powdery, circular lesions on the upper and lower leaf surfaces that can expand and coalesce until they cover entire leaves. Unlike other powdery mildews, affected leaves may rapidly wither and die, but remain attached to the stem. There are no symptoms on fruit or stems, but loss of foliage may result in sunscald. Unlike the other pathogens in this article, *O. neolyopersici* does not require leaf wetness to germinate and cause disease, but it does thrive under humid conditions and a range of temperatures (50-86°F). This pathogen can be very aggressive and lead to reduced yield and poor fruit flavor if untreated.



*Powdery mildew. Photo: S.B. Scheufele*

**Botrytis, Leaf Mold, and Powdery Mildew Management:**

- Reduce humidity within the canopy, improve air circulation, and reduce leaf wetness by controlling weeds, using wider plant spacing, removing suckers, pruning lower leaves, and watering early in the day or using drip irrigation. In high tunnels, improve horizontal airflow with fans, and reduce humidity by a combination of heating and venting in the evening, particularly when warm days are followed by cool nights.
- Provide sufficient nutrients to avoid tip burn from nutrient deficiencies and avoid excessive nitrogen fertilization. High tunnel tomato fertility recommendations were updated in the 2020-21 edition of the New England Vegetable Management Guide, based on New England state Extension research—see the [Greenhouse and High Tunnel Tomato section of the Guide](#).
- Remove and destroy all diseased plant residue; disinfest the entire greenhouse after pruning and harvest. See our [Cleaning & Disinfecting the Greenhouse](#) article for more information.
- Choose resistant varieties. This is especially effective for leaf mold management. You can find a list of resistant tomato varieties here: <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/disease-resistant-vegetable-varieties/>

- Chemical control: Start chemical control before or as soon as symptoms first develop. See the [Greenhouse and High Tunnel Tomato section of the New England Vegetable Management Guide](#) for current chemical control recommendations. Always alternate fungicide applications between materials with different modes of action to prevent resistance development. Check labels to ensure using indoors (in tunnels and greenhouses) is not prohibited. If a label does not explicitly prohibit indoor use, a product may be applied in tunnels and greenhouses. Michigan State University has a spreadsheet that compiles indoor use allowances of pesticides, [available here](#); but you should always check the label yourself as well!

**Septoria leaf spot (*Septoria lycopersici*)** usually occurs in the field and is one of the most destructive diseases of tomato foliage, resulting in considerable leaf drop that can cause sunscald, failure of fruit to mature properly, and reduced yields. Once infections begin, the disease can spread rapidly from lower leaves to the upper canopy. Symptoms consist of small, circular, tan-to-grey lesions with dark brown margins that appear on lower leaves first, after the first fruit set. Lesions usually have yellow halos and as the lesions coalesce, significant leaf yellowing can occur. *S. lycopersici* forms pycnidia (structures that produce asexual spores) in the center of expanding lesions, which can be seen with a 10X hand lens as tiny black dots. The presence of pycnidia, plus the generally smaller size of the lesions and the absence of target-like circular bands within the lesion, distinguish this disease from early blight. The pathogen overwinters on infected tomato debris or infected solanaceous weed hosts ([jimsonweed](#), [horsenettle](#), ground-cherry, and [black nightshade](#)), and can also survive on stakes and other equipment. The pathogen can also be seed-borne.



*Septoria leaf spot. Photo: B. Watt*

**Early blight (*Alternaria solani*)** occurs on the foliage, stem, and fruit of tomato, as well as on potato foliage and tubers. In tomato, the disease first appears as small brown to black lesions with yellow haloes on older foliage. Under conducive conditions, numerous lesions may occur on each leaf causing entire leaves to turn yellow. As the lesions enlarge, they often develop concentric rings giving them a bull's eye or target-spot appearance. As the disease progresses, plants can



*Early blight lesions, showing characteristic yellow haloes and concentric rings.*

*Photo: M. T. McGrath*

become defoliated, reducing both fruit quantity and quality. Fruit can become infected either in the green or ripe stage. Infections usually occur through the stem attachment. Fruit lesions appear leathery and may have the same characteristic concentric rings as the foliage. Fruit lesions can become quite large, encompassing the whole fruit. The fungus overwinters on infected crop debris in the soil and can survive there for several years.



*Stemphylium leaf spot. Photo: S. Menasha*

**Stemphylium or gray leaf spot** can be caused by several different species of the genus *Stemphylium*. This is a new

disease of tomato in the Northeast—we first saw it in MA in 2020 – but is common in southern states. Over the last few years, it’s been reported in both field and high tunnel tomatoes throughout the region. Stemphylium leaf spots are tan to gray and irregularly shaped, with *no* yellow halo. Sparse gray sporulation is sometimes visible at the center of the spots with a 10X hand lens. Lesions occur on upper and lower leaves simultaneously, distinguishing this disease from early blight and Septoria that often start on lower leaves and move upwards as the diseases progress. Similarly to early blight and Septoria, Stemphylium spores are dispersed by wind and splashing water, and the fungus can survive on crop residue in the soil as well as on seeds.

### **Septoria, Early Blight, and Stemphylium Management:**

- Some tomato and potato varieties with early blight resistance or tolerance are available. Stemphylium-resistant tomato varieties are also available. However, most tomato cultivars are susceptible to Septoria leaf spot. You can find a list of resistant tomato varieties here: <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/disease-resistant-vegetable-varieties/>
- Adequate nitrogen fertility throughout the season can help delay onset of early blight; lower leaves become more susceptible as the nitrogen demand increases with fruit production and nitrogen is pulled from older leaves. See the [field tomato](#) and [high tunnel tomato](#) sections of the New England Vegetable Management Guide for nutrient recommendations.
- Protectant fungicide sprays, beginning before symptoms begin to develop and applied at regular intervals (depending on weather conditions and disease pressure) will delay the onset of disease.
- Reduce overwintering inoculum by rotating fields out of tomato crops for at least two years, controlling solanaceous weeds, and incorporating crop debris promptly after harvest to encourage decomposition.
- Reduce the length of time that tomato foliage is wet by using drip irrigation, using wider plant spacing, and staking. Keep workers and equipment out of wet fields where possible.
- Many fungicides are registered and effective against both early blight and Septoria. Please see the [New England Vegetable Guide](#) for recommendations. Use the [TOMCAST](#) forecasting model to help with the timing of fungicide applications for early blight and Septoria.
- Stemphylium leaf spot is not currently included in the New England Vegetable Management Guide, and fewer fungicides are labeled specifically for this disease than for early blight and Septoria. In MA, fungicides can legally be used if the target crop and use pattern (e.g. foliar sprays) are both on the label—fungicides that are effective against early blight and Septoria should also be effective against Stemphylium. Chlorothalonil, mancozeb, Aprovia Top, Inspire Super, Luna Tranquility, ManKocide, Gavel, Revus Top, Mettle, Flint are labeled specifically for Stemphylium/gray leaf spot.

*--Written by Bess Dicklow, retired UMass Extension Plant Diagnostician, and Susan B. Scheufele, UMass Extension Vegetable Program*

## **NEWS**

### **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.

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

### **Informational webinar:**

**When:** TODAY, Thursday, August 18, 2022, 6 to 7 or 7:30pm

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

## **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](http://www.mass.gov/how-to/agricultural-food-safety-improvement-program-afsip)

## **MASSACHUSETTS TOMATO CONTEST TO BE HELD ON AUGUST 23**

The 37<sup>th</sup> [Massachusetts Tomato Contest](#) will be held at the Boston Public Market on Tuesday, August 23. Tomatoes will be judged by a panel of experts on flavor, firmness/slicing quality, exterior color and shape. Always a lively and fun event, the day is designed to increase awareness of locally grown produce.

Open to commercial farmers in Massachusetts, growers can bring tomatoes to the market between 8:45 am and 10:45 am on August 23 or drop their entries off with a registration form to one of the regional drop off locations on Monday, August 22. Drop off locations include sites in Great Barrington, South Deerfield, Worcester, Dighton and West Newbury. These tomatoes will be brought to Boston on Tuesday.

For complete details, including drop off locations, contest criteria, and a registration form, [click here](#). Be sure to include the [registration form](#) with all entries.

The 36th Tomato Contest is sponsored by the Massachusetts Department of Agricultural Resources, [New England Vegetable and Berry Growers Association](#) and [Mass Farmers Markets](#) in cooperation with the [Boston Public Market](#).

Questions? Contact David Webber, [David.Webber@mass.gov](mailto:David.Webber@mass.gov).

# **EVENTS**

## **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 - NEW DATE!**

**When:** Thursday, September 8, 2022 from 4-6 pm, followed by food and refreshments (Originally scheduled for August 24)

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

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.

[Click here to register.](#)

## **SAVE THE DATE - POLLINATOR HABITAT WORKSHOP**

**When:** Thursday, September 22, 2022, late afternoon/early evening (exact time TBA)

**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](mailto: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](mailto: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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