



UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



Volume 32, Number 22

August 20, 2020

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CROP CONDITIONS

Somehow, we've made it to late August—how time flies during a pandemic! With cooler daytime temperatures and cold nights, we've been consistently seeing dewy mornings, which can lead to more foliar diseases in spite of otherwise dry weather.

We had a slow, cool start to the season but by now we have more than caught up and at UMass Amherst we are now 91 GDD higher than this date last year and 53 GDD higher than the 5-year average. The heat has pushed crops along quickly and we're seeing an early end to summer crops like watermelons and an early start to fall crops like winter squash and pumpkins. Many growers are scrambling to make time to harvest this early crop of pumpkins and wondering how to hold these crops until the customers are ready for them. The article later this issue has tips for curing and storage; take care to do the best you can to get the squash cured up so it will keep as long as possible.

We are also still seeing damage from heat and drought including calcium deficiencies in celery, brassicas, and fruiting crops, as well as poor ear fill in corn and flower drop and fruit abortion in fruiting crops. With both drought and periods of excess water becoming the new norm amidst a changing climate, water management on the farm is becoming ever more important. We're excited to be holding an Agricultural Water Twilight Series next month, with virtual sessions on topics including water monitoring tools, water testing for FSMA, post-harvest water quality, and more. We'd love to have you—see the Events section of this issue for more info and [register online!](#)



It's dry out there! To minimize soil erosion, wait for a calm day to do any tillage, and be sure to plant cover crops as much as possible! See article this issue for ideas of what to plant now.

Photo: G. Higgins

through fall brassica fields. Spores of *Alternaria* and downy mildew are spread by wind, rain, and splashing water. Splashing water and flea beetles can also spread *Alternaria* and black rot. [Flea beetles](#) are also very active now, so controlling flea beetles can help reduce spread of disease.

Cucurbits

[Downy mildew](#): Susceptible, untreated, cucumber plantings are starting to go down now. Planting resistant varieties is an important IPM practice for fall plantings. In our trials we have seen good results from the varieties Bristol, Citadel, SV4142CL, DMR401, and DMR264.

[Plectosporium blight](#) was seen this week in zucchini where it was causing white, lens-shaped lesions on petioles, leaf veins, and round white spots on leaves. Affected leaves and stems become brittle. Later, round white lesions can

PEST ALERTS

Brassicas

[Alternaria leaf spot](#), [black rot](#), and [downy mildew](#)

(reported a few weeks back) are continuing to spread

develop on fruit. When *Plectosporium* blight occurs, rotate away from summer squash and pumpkins for 2 years. Choose sunny, well-drained sites for planting cucurbits. Scout for disease and apply fungicides when disease first occurs. Thorough coverage of foliage, vines, and fruit is necessary for good control. The strobilurin (QoI) fungicides, e.g. Flint (trifloxystrobin), Cabrio (pyraclostrobin), and Quadris (azoxystrobin), will control this disease.

Pepper

Pepper anthracnose is showing up on peppers now, where it causes dark sunken spots. When conditions are favorable, salmon colored spores may ooze out of the center of lesions (pictured right). We usually see this only on ripe fruit, but a new species of anthracnose (*Colletotrichum acutatum*) is now present and attacks fruit of all ages and is very aggressive. During favorable weather conditions, significant losses to peppers can occur. Do not plant peppers in the same area following disease for at least 1 year. Remove all diseased plant material from the field. Most peppers are susceptible but North Star and Paladin were the least susceptible in one report. Cabrio has performed better than Quadris for this disease.



Plectosporium blight on zucchini petioles.
Photo: G. Higgins

Pepper anthracnose.
Photo: R. Norton

Sweet corn

European corn borer (primarily just the NY strain) continues to be trapped at fairly low numbers and damage is being reported now, mostly in peppers that have not been sprayed. Fall armyworm (FAW) and corn earworm (CEW) numbers are really driving the spray program now in corn, and ECB that might end up in corn is being controlled by these sprays. Numbers of CEW are down a bit from the last two weeks but we are starting to see damage in the field now from eggs laid by moths that were carried up with the hurricane two weeks ago. FAW numbers also remain high in traps and damage in scouted fields is severe, with some fields having 30-40% plants damaged. It is important to get out of the truck and scout fields to prevent FAW damage. Check whorl-stage corn for large, ragged holes in the foliage, and big clumps of frass in the whorl. Often, the FAW caterpillar will be within the developing tassel. FAW will also bore into the sides of ears, similarly to ECB, and can also infest ear tips.

Table 1. Sweetcorn pest trap captures for August 14-20, 2020

Location	GDD (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
Western MA						
Sheffield	-	1	2	N/A	2	6 days
Southwick	2204	9	0	5	12	4 days
Whately	2207	3	0	N/A	6	5 days
Central MA						
Bolton	2084	0	0	23	3	6 days
Leominster	2053	0	0	2	7	4-5 days
Spencer	2023	5	0	0	7	4-5 days
Eastern MA						
Ipswich	1906	0	0	1	30	4 days
Concord	2040	5	0	3	19	4 days
Millis	2244	4	0	N/A	14	4 days
Sharon		-	-	N/A	-	-
Seekonk	2293	1	0	28	9	4 days
Swansea		8	0	8	15	4 days
- no numbers reported for this trap						
N/A this site does not trap for this pest						
*GDDs are reported from the nearest weather station to the trapping site						

Table 2. Spray intervals for corn earworm based on *Heliothis* net trap captures

Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	no spray
0.2 - 0.5	1.4 - 3.5	6 days
0.5 - 1	3.5 - 7	5 days
1 - 13	7 - 91	4 days
Over 13	Over 91	3 days

Large vertebrate pests, including birds, raccoons, coyotes, and bears, are all venturing into corn fields in search of a moist, sweet treat. Birds can be somewhat successfully controlled using a combination of scare tactics like noise-makers, effigies, scare-eye balloons, and lasers—all of which must be moved often—and repellents such as ‘Avian Control.’ Raccoons feed at night on milk stage corn. The most effective control for raccoons is electric fencing set with one wire at 6-inch height and a second at 12 inches. Sometimes a single wire at 6 inches works well. Be certain that vegetation is cleared from the fence, or it will reduce the shock an animal receives when it contacts the wire. Black bears also readily attack sweet corn and field corn in the milk stage. Damage often occurs in large spots in the middle of the field, where the bears pull down all of the stalks and are hidden from view. Since black bears are protected by laws, contact your state Fish & Game officials or USDA Wildlife Services staff for assistance if you have a bear problem.



Yellowstriped armyworm. Photo: R. Otens, Univ. of GA, Bugwood.org

Multiple crops

Yellowstriped armyworm was seen this week in cucumber and field tomato; it is also known to affect pepper, beans, greens, and corn. This armyworm is not common in New England and is usually more of a southern pest. It usually feeds on foliage but later in the season, around this time, it may also feed on tomato and pepper fruit. Yellow-striped armyworms have natural enemies in the field including parasitic wasps and flies, and there is also a naturally occurring virus that periodically attacks it. If a damaging population is present, insecticides labeled for other armyworms or corn earworm can be used in MA.



Calcium deficiency is showing up in a variety of crops and presenting as tip burn in brassicas, black heart in celery, and blossom end rot in tomatoes and peppers. Usually calcium is not deficient in soils, but rather, crops that do not get enough water cannot take up calcium that is there and so these issues are generally more related to uneven or insufficient watering.



Tip burn in brassica (Photo: S.B. Scheufele) and blossom end rot in pepper (Photo: T.A. Zitter), both caused by calcium deficiency.

PUMPKIN & WINTER SQUASH HARVEST, CURING & STORAGE

Pumpkin and winter squash are maturing quickly in the hot, dry weather and many crops are already ready and growers are starting harvest now. Correct harvest timing and curing and storage conditions can have a significant effect on eating quality, storage length, post-harvest disease.

Pumpkin Harvest Timing: 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 go down from powdery or downy mildew, fruit can get sunscald. There are several races of cucurbit downy mildew, and only some affect pumpkin. So far this year, downy mildew on pumpkin has not been reported north of Tennessee. However, powdery mildew is widespread. Foliar diseases, especially powdery mildew, can also reduce quality of pumpkin handles, leading to reduced marketability for jack-o-

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.

The [UMass Plant Diagnostic Lab](#) and the [UMass Soil & Tissue Testing Lab](#) are both now open.

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. However, we recommend that growers harvest as soon as crops are mature and store under proper conditions, if it is feasible. 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 6, 2018 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.



Butternut squash coming in from the field.

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 Conditions below).

Harvest Timing for Eating Quality: For pie pumpkins and winter squashes, harvest timing determines the flavor and texture of the fruit. For years, we’ve referenced the work of Dr. Brent Loy, researcher emeritus at the NH Ag Experiment Station, for understanding winter squash maturity and harvest timing, among countless other cucurbit topics. We were sad to share the news that [Dr. Loy passed away earlier this summer](#). His research and cucurbit breeding program have had deep impacts on New England farmers and he developed many cucurbit varieties that you may recognize and grow yourself, including ‘Slick Pik’ summer squash and “Sarah’s choice” melon. His insights, generosity, and humor will be missed by many across the agricultural community.

Before understanding when the best time is to harvest squash, it’s important to understand the difference between “mature” squash and squash that is ready to be eaten. As squash fruits grow, they accumulate starch, which is then converted into sugar both during maturation in the field and after harvest 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. 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 more time to convert starches to sugars and must be stored for specific amounts of time before they are eaten.

Most squash varieties are mature and ready to be harvested 50-55 days after fruit set, or days after pollination (DAP). In many varieties, this is many weeks after the fruit turns a marketable color, which can be misleading. According to Dr. Loy, 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—see the end of this article for more information about specific varieties.

Curing Conditions: In some cases, squash needs to be stored for a short period of time (5-10 days) at a high temperature (80-85°F) and 80-85% relative humidity immediately after harvest, either in the field if weather allows, or in a well-ventilated barn, greenhouse, or high tunnel. Night temperatures should not drop below 60°F. These conditions will speed up the conversion of starches to sugars to achieve good eating quality earlier on and will allow fruit skin to harden and wounds to heal. You may not want to cure squash if it's destined for long-term storage and if it is free of wounds—squash in long-term storage should have sufficient time to convert starches to sugars and can go directly into storage conditions without the extra boost. Squash types like acorn and delicata are ready to eat at harvest (if they're harvested when they're mature!) and only need to be cured if you want to store them and the skin is wounded.

Storage: Pumpkins and winter squash should be stored in a cool, dry, well-ventilated storage 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.

***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. UNH has developed two varieties, 'Honey Bear' and 'Sugar Dumpling', that both have 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.

***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 the more nutritious.

--Written by G. Higgins and R. Hazzard, compiled 2018 from [Eating Quality in Winter Squash and Edible Pumpkins](#) and [The Nuts and Bolts of Fruit Quality in Cucurbits](#) by Brent Loy researcher emeritus, New Hampshire Agricultural Experiment Station and professor emeritus of genetics, UNH.

BACTERIAL DISEASES OF VEGETABLE CROPS, PART 2: VASCULAR PATHOGENS

Some plant pathogenic bacteria cause localized infections resulting in leaf spots and blights, which were covered in Part I of this series found [here](#). Others are capable of entering the host's vascular system, where their proliferation blocks water-

conducting vessels, causing a symptom known as vascular wilt. Plants suffering from vascular wilt will show symptoms of wilting even when soil moisture is adequate. Wilt may occur only on one side of affected hosts or may involve the entire plant.

Like those that cause leaf spots, the bacteria that cause vascular wilts can grow at a wide range of temperatures, but each has an optimum range in which disease development is most likely to occur. Although disease development may slow or even cease at temperatures well outside the optimum, infections may simply remain latent until environmental conditions once again become conducive to disease.

Bacterial transmission between plants is most commonly facilitated by splashing water (especially wind-driven rain and overhead irrigation) and mechanically by humans, tools, or insects. Water may also carry bacteria as it moves through the soil. Bacteria enter plants through wounds or natural openings such as stomata and hydathodes but cannot penetrate host tissue like many fungi can.

Three common vascular diseases in vegetable crops are black rot of brassicas (*Xanthomonas campestris*), bacterial canker of tomato and pepper (*Clavibacter michiganensis*) and bacterial wilt of cucurbits (*Erwinia tracheiphila*). All of these diseases may be seed-borne.

In black rot of brassicas, characteristic V-shaped lesions with brown centers and yellow margins form at the leaf margins when bacteria enter through hydathodes. Veins within lesions turn black. When bacteria enter through wounds, irregular lesions and localized vascular discoloration typically occur.

Bacterial canker of tomato typically causes marginal necrosis of leaves. Cankers and vascular discoloration are visible in stems. Adventitious roots are often abundant. Fruit may develop small white lesions with brown centers. Peppers are also susceptible though are not as commonly affected as tomato.

Cucumbers and melons are most susceptible to bacterial wilt of cucurbits: symptoms in squash and pumpkin are typically milder. Cucumbers and melons develop wilting that may or may not disappear when temperatures drop in the evening. Eventually, leaves turn yellow or brown and plants collapse. Bacterial strands may be observed when the lower stem is cut and the two ends are gently pulled away from each other. Cucumber beetles spread the pathogen from plant to plant.

A good IPM program for managing these bacterial pathogens involves starting with clean seeds and transplants. Like some fungal diseases, bacterial diseases can also be seed-borne. Hot water treatment can significantly reduce the number of bacterial cells present in seed. The UMass Vegetable Program offers a hot water seed treatment service; [click here for more information](#). Do not reuse flats, pots, stakes, or growing media, or save seeds from infected plants. Grow resistant varieties when available. Current information on disease resistant vegetable cultivars may be found at <http://vegetablemdonline.ppath.cornell.edu/Tables/TableList.htm>.

Most plant pathogenic bacteria do not survive more than a month or two on their own in the soil; however, they can survive for much longer inside of infected plant debris in the soil and may also persist in perennial weeds. Sanitation is therefore another important cultural practice for disease prevention and management. Remove infected plants and plant debris from the greenhouse or field. It is also advisable to remove healthy looking plants adjacent to symptomatic ones. In the field, disc



Black rot in cabbage, displaying V-shaped lesions caused by bacteria entering the leaf through hydathodes (vascular pores at the edges of the leaves).



Foliar symptoms of bacterial canker in tomato. Photo: S.B. Scheufler



Bacterial wilt in winter squash. Photo: G. Higgins

residues and plow deeply at the end of the season to bury remaining plant debris and speed its breakdown. Rotate away from host crops for at least two years. Practice good weed management, as some weed species may harbor bacteria that are pathogenic to crops. Control insect pests that can spread bacteria through their feeding.

Some fungicides containing copper, copper plus mancozeb, and phosphorus acids also have bactericidal activity and are labeled for use on vegetables. Organic products with active ingredients such as botanical oils, *Bacillus* species, and other ingredients may also be helpful. Keep in mind, however, that the efficacy of these products is limited and there is no substitute for good crop management practices.

Tips for maximizing spray efficacy include the following:

- Obtain an accurate diagnosis. Wilting can be caused by several different factors including root rot and high soluble salts; it is therefore important to obtain an accurate diagnosis before proceeding with chemical management tactics. With the exception of those mentioned above, most fungicides have no effect on bacteria. Knowing that a disease is caused by a bacterium and not a fungus enables the grower to select an effective product to apply, potentially saving time, money, and unnecessary applications of agrichemicals.
- Be aware that none of these products can cure a plant that is already infected, but they can help prevent healthy plants from becoming infected; therefore, they are best used as protectants.
- Thorough coverage is imperative.
- Remove symptomatic plants and plant debris from the greenhouse or field as thoroughly as possible **before** spraying.
- Don't apply bactericides when plants are wet or use an air blast sprayer. The force of the airblast sprayer can spread drops of moisture containing bacteria among plants and at the same time cause small wounds through which infection can occur.
- Do not rely on copper alone for bacterial disease management. Copper-resistant strains of some plant pathogenic bacteria have been identified.
- Experimental evidence suggests that greater efficacy may be achieved when a plant defense activator (e.g. acibenzolar-s-methyl or extract of *Reynoutria*) is included in the spray program.

--Written by Angie Madeiras, UMass Plant Diagnostic Lab

LATE-SEASON COVER CROPS

A well-established late-season cover crop increases organic matter, improves soil structure, scavenges remaining nutrients, chokes out weeds, and prevents soil erosion. Each cover crop species has strengths and weaknesses. We have noticed that the fall planting window has extended, in some cases into November! Play with seeding dates on your farm this year; hopefully you will succeed in getting some ground cover. Below is a list of several good choices for this time of year, depending on your specific goals and field conditions.

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.

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' and these grasses' dense root system that outcompetes weeds, protects against erosion, and is easy to incorporate in the spring. Annual ryegrass can



Plant a grass species with a legume to maximize the benefits of both: grasses provide structure for vining legumes, like the peas pictured here, and legumes fix nitrogen for the grass. The combination provides better cover than one alone. Photo: K. Campbell-Nelson

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 15th 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. 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 15th. 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 15th, 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.

LEGUMES are a good choice if you are interested in adding nitrogen to the soil. 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 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 self-seeded vetch. 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.

Red clover (*Trifolium pratense*) is a short-lived perennial that is somewhat tolerant of soil acidity or 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. **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. **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.

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. Do not plant mustards or radishes following or ahead of any brassica crops since they are in the same family and are susceptible to the same pests.

Tillage radish (*Raphanus sativus*), also known as daikon, forage, or oilseed radish act as biological subsoilers, often producing 8-14 inch tap roots. 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.

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:

[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.

NEWS

URBAN AGRICULTURE SURVEY

What do you need from your local Cooperative Extension? UMass Extension is collaborating with land-grant schools across the Northeast U.S. to gather your experiences and thoughts about **urban agriculture and the kind of support urban growers need to be successful**. As budgets get tight, we want to be able to demonstrate to current and future funding sources that it is critically important to invest in urban agriculture.

Please fill out [this survey](#) to help us get a better understanding of what urban agriculture looks like and the important role that Extension plays!

The survey should take less than 30 minutes to complete. It is open to all individuals who are at least 18 years old and grow food plants or engage in other agriculture in urban areas in the Northeast U.S.

The survey is available online at this link: https://udc.iad1.qualtrics.com/jfe/form/SV_3t0bgrmjwRG0WTH

This research has been approved by the University of Maryland Institutional Review Board (project # 1013685-4). If you have any questions, please contact Neith Little at [ngliddle@umd.edu](mailto:nglittle@umd.edu) and Dr. Matthew Richardson at matthew.richardson@udc.edu

APPLICATION DUE NEXT WEEK! ADDITIONAL COMMODITIES ELIGIBLE FOR CORONAVIRUS FOOD ASSISTANCE PROGRAM (CFAP)

The USDA, Coronavirus Food Assistance Program (CFAP) adds additional commodities, and expands funding for seven previously funded commodities. USDA's Farm Service Agency (FSA) is accepting applications through **August 28, 2020**. Read more about these changes [here](#), or contact your local FSA office.

EVENTS

UMASS VEGETABLE PROGRAM: AGRICULTURAL WATER TWILIGHT SERIES

The UMass Extension Vegetable Program is offering a series of online twilight meetings all about water! We will welcome Extension specialists and farmers from Massachusetts and beyond to cover a range of water-related topics.

Part I: Water Use Regulations, Water Monitoring Tools, and Efficient Irrigation

Wednesday, September 16, 2020 - 6:00pm to 7:30pm

Speakers:

- **Rachel Schattman, UMaine Agroecology Lab** - Water use regulations in New England
- **Joshua Faulkner, UVM Extension** – Moisture monitoring technologies and irrigation efficiency
- **Tim Wilcox, Kitchen Garden Farm, Sunderland, MA** – Tile drainage, wells, and irrigation equipment

Register here: <https://umass-amherst.zoom.us/meeting/register/tJcud-mgpzovGdejLQO66TRpmx3yyBITJ1V-%C2%A0>

Part II: Water System Mapping and Water Testing for FSMA

Wednesday, September 23, 2020 - 6:00pm to 7:30pm

Speakers:

- **Massachusetts Department of Agricultural Resources Produce Safety Inspection Program** - Massachusetts' draft produce safety regulations and update on water testing rules
- **Scott Monroe, Purdue Extension** - Water sampling, understanding risks to source water and understanding water test results
- **Phil Tocco, MSU Extension** - Water distribution system mapping and inspections

Register here: <https://umass-amherst.zoom.us/meeting/register/tJMvde2hrDspHtIxtBWDbCe75aHup0t6Z4aR%C2%A0>

Part III: Post-harvest Water Quality and Sanitizer Use

Wednesday, September 30, 2020 - 6:00pm to 7:30pm

Speakers:

- **Amanda Deering, Purdue Extension** - Background on the different sanitizer materials available or practical for small-medium scale growers and how to measure and monitor them
- **Phil Tocco, MSU Extension** – Sanitizer use demonstration

Register here: <https://umass-amherst.zoom.us/meeting/register/tJErcOCqrTwiGNaUN7Sn79DyZEG0zMUi6tma%C2%A0>

LUNCHTIME WEBINAR - USING BIOLOGICAL CONTROL AND PESTICIDES TOGETHER TO MANAGE GREENHOUSE INSECT AND MITE PESTS: CAN IT BE DONE?

Join the UMass Extension Landscape, Nursery, and Urban Forestry Program and Dr. Raymond Cloyd, Professor of Entomology and Extension Specialist, Kansas State University will discuss the fundamentals of integrating pesti-

cides (insecticides, miticides, and fungicides) with biological control agents (parasitoids and predators) to mitigate problems with insect and mite pests. He will discuss the direct and indirect effects of pesticides on biological control agents and provide examples of situations where both pest management strategies may be integrated. Raymond will include information based on scientific research conducted in his laboratory at Kansas State University.

When: Thursday, August 27, 2020, 12-1pm

Registration: <https://attendee.gotowebinar.com/register/5575748117982713616> Registration is required to attend.

The webinar is **free of charge** for all attendees thanks to gracious financial support from the [Massachusetts Flower Growers Association](#) on the behalf of the greenhouse industry in Massachusetts. After registering, you will receive a confirmation email containing instructions for joining the webinar.

One (1) pesticide re-certification contact hour for Massachusetts categories 26, 29, 31 and Applicator's (Core) license has been approved for this program, valid for equivalent categories in all New England states.

Contact: Geoffrey Njue at gnjue@umass.edu or Jason Lanier at jdl@umass.edu

VIRTUAL PRODUCE SAFETY ALLIANCE GROWER TRAINING

Due to the COVID-19 pandemic, many states are now offering [remote Produce Safety Alliance \(PSA\) Grower Training \(GT\)](#) courses to help growers satisfy the FSMA Produce Safety Rule requirement outlined in § 112.22(c) that requires 'At least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.' A [list of upcoming PSA GT courses](#) can be found on the PSA website. Remote PSA GTs are often limited to residents of the host state, as they may be subsidized by state funds. However, some states do not have funds set aside to support attendance at PSA GTs and other states do not have an in-state team trained to deliver the PSA GT.

To meet the needs of domestic growers who do not currently have access to other PSA GT options, and for those to whom the [online PSA GT](#) course is not a good option, the PSA team will be offering a remote PSA GT course on September 8-9, 2020. The course is only available to domestic participants because of the need to ship manuals so everyone has one before the start of the course. The registration fee is \$130 and will include a PSA Grower Training Manual and a Certificate of Course Completion from the Association of Food and Drug Officials (AFDO).

The course will be delivered using the Zoom videoconference platform. In order to be eligible for the Certificate of Course Completion from AFDO, you must be present for and participate in all course modules. Your video must be visible to the presenters (virtual backgrounds are acceptable, but we must be able to see you to verify participation). If you are new to Zoom, visit our page of tips for [Preparing to Join a PSA Grower Training Zoom Meeting](#).

When: September 8-9, 11am-4:30pm. Make sure you are available for those times on both dates before registering for this course.

Registration: <https://producesafetyalliance.cornell.edu/training/grower-training-courses/remote-psa-grower-training-course-sept-8-9-2020/>. This course is limited to 20 participants. You will be contacted for your payment details once we meet the course minimum of 10 registrations. If we do not meet the minimum by Monday August 24, the course will be canceled. We plan to offer additional PSA team-led GT courses later this fall and will share those dates when they become available.

PREVENTIVE CONTROLS WEBINAR FOR SMALL AND MEDIUM FOOD PROCESSORS

Is your business a small or medium food processor? If yes, have you ever thought about what food safety laws you should be following, and what the possible consequences are for not doing so? This 1-hour webinar is the first in a series of three specifically designed for small and medium sized processors affected by the Food Safety Modernization Act's Preventive Controls for Human Foods Rule. The webinar will give you an easy-to-understand overview of the FDA Preventive Controls Rule and will help you learn what it means to be in compliance with these laws. This webinar is the first in a series of opportunities to learn about and receive subsidized training and technical assistance to bring your business into compliance with the Preventive Controls Rule – more details on future programs to come.

When: The webinar will be held on the 3 dates listed below. To be eligible for future programming and technical assistance, you must attend **one** of the sessions below.

- August 20, 12pm - 1pm

- August 27, 8am-9am
- September 10, 7pm - 8pm

Registration: https://umassamherst.col.qualtrics.com/jfe/form/SV_6QA5XrtoOPyFZ2d

Please contact us at valueaddedfood@umass.edu for information regarding this series of events.

VIRTUAL LISTENING SESSIONS: FEASIBILITY OF INSURING LOCAL FOOD PRODUCTION

You are invited to participate in a Virtual Listening Session with Agralytica, which is working under contract for USDA's Risk Management Agency (RMA).

Why? As part of the 2018 Farm Bill, Congress required RMA to solicit feedback about improved crop insurance coverage options for farmers and ranchers selling to local food markets (including but not limited to farmers markets, Community Supported Agriculture (CSAs), road-side stands, restaurants, retailers, schools, and institutions). This includes discussing how existing crop insurance programs can be improved, as well as exploring the possibility of a new crop insurance program.

The feedback we receive will help us identify potential changes and/or additions to insurance options for producers supplying local markets.

Who? The sessions are primarily for farmers and ranchers who sell to local food markets and their representatives in the federal crop insurance industry.

When? Sessions relevant to MA growers:

- Tuesday, September 1, 12noon: Session for producers
- Wednesday, September 2, 12noon: Session for approved insurance providers
- Thursday, September 3, 12noon: Sessioin for floriculture industry

[For more information on these sessions, including Zoom links, and instructions on how to join by phone, click here.](#)

UPCOMING UNH WEBINARS

- Wed, Sept 9. Noon-1pm. [Crop storage: Hold on to what you've got. North Country Lunch and Learn.](#)

For years Lunch and Learns were a staple of Coos County Cooperative Extension's connection with the community. We will be bringing back the Lunch and Learns as a way for people to get together as we continue to practice social distancing. Do your part for society by eating lunch in front of your computer! These occur monthly on various topics and hope everybody can learn something new and interesting. Learn more and register at the link above.

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

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