UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

Insect netting being put to good use covering kale at Full Well Farm in Pittsfield, MA! Photo: S. B. Scheufele

Crop conditions

Finally, some nice weather for farming! Cool nights make for pleasant morning harvests and sunny afternoons are good for killing weeds and getting through bulk harvests. Melons are winding down while other bulk harvests are starting—potatoes, leeks, and sweet potatoes. Fruiting crops are coming in fast in all the colors of the rainbow. A few farms have reported that crops that made it through the wettest parts of summer are yielding well after getting more water than they normally would via irrigation, and others report very strong sales and good prices—not too shabby! Field prep has started for winter crops in tunnels; check out our research reports if you are looking for new spinach varieties to try. If you are looking to source seeds that don't appear in most catalogs, work with your seed rep and collaborate with neighboring growers to meet minimum seed orders. For pest alerts there is not much new to report this week, the same old critters continue to affect crops—Phytophthora spreading through squash and pepper fields, tomato diseases aplenty, caterpillars and black rot in brassicas, Cercospora leaf spot and leafminers in Swiss chard and beets, squash bugs and powdery and downy mildews in cukes and squash, and so on. Below are a just a few new ones to look out for.

Pest alerts

Brassicas

Cabbage aphids: Research has shown that cabbage aphid populations can grow more quickly at cooler temperatures like we are experiencing now. Reproduction rates are highest at 50-68°F, and the development of nymphs stops when temperatures reach 95°F. Cabbage aphids prefer to feed on young leaves, flower buds, or seed stalks in the upper part of the plant and also feed in developing Brussels sprout buds. Feeding injury includes wrinkled and downward-curling leaves, yellow leaves, and reduced growth. Contamination of marketable parts of the plant with aphids is frequently the biggest problem, as is contamination of the plant with aphid honeydew. For successful chemical control of cabbage aphid, treatment

Cabbage aphids

Contact Us:

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

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

must begin early, before infestations become severe. Scout weekly, starting before harvested portions of the crop begin to develop. Treat when >10% of plants have at least 1 aphid, or scout 10 leaves at 10 sites for 100 leaves per field and treat if >20% have aphids. Use lower thresholds when harvestable portions of the crop have started developing.

Cucurbits

Cucurbit downy mildew was reported on butternut squash in NJ this week but as far as we know has not reached New England yet in this crop.

Plectosporium blight is widespread in cucurbit crops now, primarily on pumpkins, summer squash, zucchini and a few varieties of gourds. This disease thrives in wet weather, so we are seeing more of it now than in other years. This disease starts as <¼" white lesions on vines, petioles, and leaf veins. The lesions tend to be diamond to lens-shaped on fruit while leaf lesions are usually round. The lesions increase in number and coalesce until most of the vines and petioles turn white and the foliage dies. On fruit, *Plectosporium* causes white, tan, or silver russeting which can merge to form a continuous dry, scabby surface. Severely infected pumpkin vines become brittle and will shatter if stepped on. Early in the infection cycle, foliage tends to collapse in a circular pattern before damage becomes more universal throughout the field. These circular patterns can be easily detected when viewing an infected field from a distance. Practicing long rotations out of cucurbit crops and planting cucurbits in well-drained, sunny fields can help slow the onset of Plectosporium. Fungicides can effectively control Plectosporium blight, but need to be applied when symptoms first appear. See the appropriate crop disease section of the New England Vegetable Management Guide for labeled fungicides.

Plectosporium blight in zucchini. Photo: G. Higgins

Yellowing is fairly widespread in squash and pumpkin fields now, likely due to loss of nutrients due to excessive rain, causing premature dieback of foliage.

Solanaceous

No new reports of **late blight** this week, phew. The latest reports are from central NY, near Syracuse.

Sweet Corn

Corn earworm trap counts remain high, with a max of 184 caught this week at one site in Bristol Co. (see Table 2). Almost all trapping sites are on a 4-day spray schedule. Insecticide resistance evaluations in Delaware this year have shown a 38% survivorship in cypermethrin, and are showing that amongst the pyrethroid active ingredients, the order of effectiveness is Hero (high rate), followed by Baythroid, followed by Brigade and Warrior. Besiege and Elevest are providing the best control there—both are premixes with chlorantraniliprole. See more from their pest scouting report here.

Fall armyworm is continuing to cause damage in the last batch of whorl stage corn. There is FAW resistance to pyrethroids, so tank-mix with something like Lannate. Attribute II corn has been controlling FAW well, as well as other caterpillars, but **sap beetles** can become a problem in these crops since they are not being sprayed for other pests. The most effective time to spray for sap beetles is in early silk, so scout blocks at full tassel and early silk to

determine if beetles are present. There is no specific threshold for sap beetles. 1 or 2 sprays, made 3 and 6-7 days after silking is the most effective schedule. In University of Maryland research, later sprays did not improve control. Warrior, bifenthrin, and Lannate are the most effective materials; carbaryl is effective too but cannot be applied in the early silk period during pollen shed and you can't hand harvest after using carbaryl.

Sap beetle adults and larvae in sweet corn. Photo: J. Obermeyer

Two-spotted spider mite damage in eggplant. Photo: J. Boucher

European corn borer trap counts remain low and should stay low for the remainder of the season. Any larvae in fields now will remain in crop residues as pupae and will emerge from this residue next spring. Till under residues promptly after harvest to reduce this overwintering population.

Various

Mite populations can really explode this time of year in eggplant, vine crops (especially watermelons and cucumbers), and both field and tunnel tomatoes. Leaves may look off-color (yellowed or whitish) with pale flecking. Check under foliage for presence of webbing and mites; focus on older leaves and plants around field edges. Outbreaks are often caused by the use of broad-spectrum insecticides that kill beneficial insects that normally keep **two-spotted spider mite** populations in check. See particular crop sections of the New England Vegetable Management Guide for specific management recommendations.

Table 1. Corn earworm spray intervals based on Heliothis trap moth captures

Moths per night	Moths per 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

Table 2. Sweetcorn pest trap captures for week ending August 31

Location	GDD* (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
Western MA						
Feeding Hills	2232	1	0	0	25	4 days
Southwick		0	0	0	70	4 days
Granby	2145	5	0	1	35	4 days
Whately	2240	3	0	0	75.5	4 days
Central MA						
Leominster	2297	1	0	0	152	3 days
Lancaster		7	0	1	28	4 days
North Grafton	1975	2	0	1	35	4 days
Spencer	2084	0	0	0	20	4 days
Eastern MA						
Bolton	2120	0	0	n/a	19	4 days
Concord	2095	1	0	3	29	4 days
Haverhill	2166	0	9	7	36	4 days
Ipswich	2069	0	0	9	37	4 days
Millis	-	-	-	n/a	58	4 days
North Easton	2213	0	0	0	19	4 days
Sharon		6	0	2	16	4 days
Sherborn	2218	1	0	0	9	4 days
Seekonk	2149	0	0	0	184	5 days
Swansea		-	-	-	77	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

Fall soil testing

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

Soil Sampling Tips

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

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

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

Submitting Soil Samples

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

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

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

Types of Fall Soil Tests.

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

A standard soil test includes phosphorous, potassium, calcium, magnesium, and sulfur, as well as micronutrients. At UMass, the standard test automatically includes pH, but does not include nitrate or organic matter; these additional parameters can be requested as add-ons to the standard test. Results from a standard soil test will inform how much of what type of fertilizer or soil amendment you should add to a field for next season's crop. When submitting your soil sample for testing, you can include a crop code on the form for the crop to be grown in that field the following year, and you'll receive nutrient recommendations based on that crop's nutrient needs and the soil test results. Haven't prepared your crop rotation plans yet? No worries. You may ask for recommendations for up to 3 different crops with-

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

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

Interpreting Results and Choosing Amendments

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

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

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

Nutrient levels in composts can vary widely – e.g. phosphorous levels can vary from 0.1-3% – so analysis is important for determining rates of application. A compost analysis should be completed to measure nutrient availability and to determine if the product is finished before applying to the field. Unfinished compost applied to the field may harbor pathogens or harm crops as it continues to decompose. Ammonium content below 100mg/kg and a carbon:nitrogen ratio of 20:1 indicates a finished compost. Higher amounts of ammonia indicate active decomposition, or unfinished compost. The C:N ratio is reduced as microbes break down carbon content in the pile and convert it to CO_2. Compost analysis is available through the UMaine Soil Lab.

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

Manure is an excellent source of nutrients, however, as manure ages and decays, considerable nutrient loss occurs from leaching, surface runoff, or volatilization of ammonia into the atmosphere. Manure may also contain pathogens such as *E. coli* and *Salmonella*. If raw manure is applied to vegetable fields, especially for crops that are likely to be consumed raw (e.g. carrots but not potatoes), this food safety risk should be minimized by maximizing the interval between manure application and crop harvest. Certified organic producers must follow the National Organic Program Standards (NOP) 120:90 day rule that says that you need to wait 120 days after raw manure application to harvest vegetables where the harvesteable portion of the crop touches the soil (e.g. carrots, melons, lettuce), or 90 days for vegetables where the harvestable portion of the crop does not touch the soil (e.g. tomatoes). For farms covered by the

Food Safety Modernization Act, there is no specified application interval required but this NOP rule is a good rule-of-thumb to follow per the FDA. Ideally, manure should be applied in the fall or to a non-food rotation crop. Fall-applied manure should be incorporated immediately and a winter cover crop should be planted to protect N from leaching. Make manure applications in cold weather to reduce volatilization, but not to frozen ground, as this increases surface runoff potential. In no-till systems, research has shown that surface-applying manure to a growing cover crop will reduce nutrient losses compared to surface applications to bare ground. In order to make accurate nutrient applications to best fit your crop needs, a manure analysis should be conducted—manure analysis is available through the UMaine Soil Lab. Be sure to submit your samples in a tightly sealed container or the postal service will be very unhappy with you!

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

- **Legume cover crops** provide up to 100 lb PAN/A when incorporated, because they fix nitrogen from the air. To maximize PAN contribution from legumes, kill the cover crop at bud stage in the spring.
- **Cereal cover crops** *immobilize* up to 50 lb PAN/A because the high carbon content leads to a spike in soil microbe activity, which ties up the nitrogen in the soil. To minimize PAN immobilization from cereals, kill the cover crop during the early stem elongation (jointing) growth stage.
- **Legume/cereal cover crop mixtures** vary widely in how much PAN they add to the soil, depending on legume content. When the dry matter from a cover crop mix is 75% from cereals + 25% from legumes, PAN contributions is usually near zero when incorporated. Higher legume content means higher PAN contribution and higher cereal content means more N immobilization.

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

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

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

Vegetables:

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

Cover Crops:

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

Greenhouse:

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

--UMass Vegetable Program

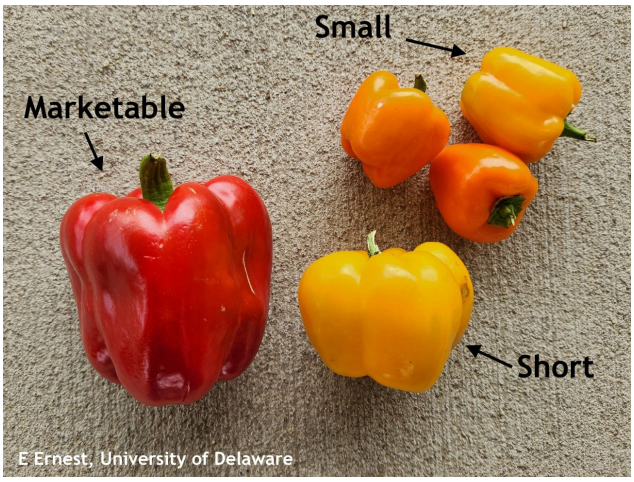
FACTORS AFFECTING BELL PEPPER FRUIT SIZE AND SHAPE

--Written by Emmalea Ernest, Univeristy of Delaware Extension Fruit & Vegetable Specialist. Originally published in the UD Cooperative Extension Weekly Crop Update Volume 31, Issue 22*, August 25, 2023.*

Bell pepper fruit must reach adequate size, have a symmetrical shape, and have an acceptable height to diameter ratio in order to be marketable, especially in wholesale markets. Bell pepper fruit characteristics are influenced by variety, but also by environmental factors that occur during flower formation and early fruit development. Horticultural researchers

have attempted to identify specific environmental factors that affect pepper size and shape, but some mysteries remain.

Small and misshapen peppers (left) have inadequate or uneven pollination compared to marketable fruit (right).

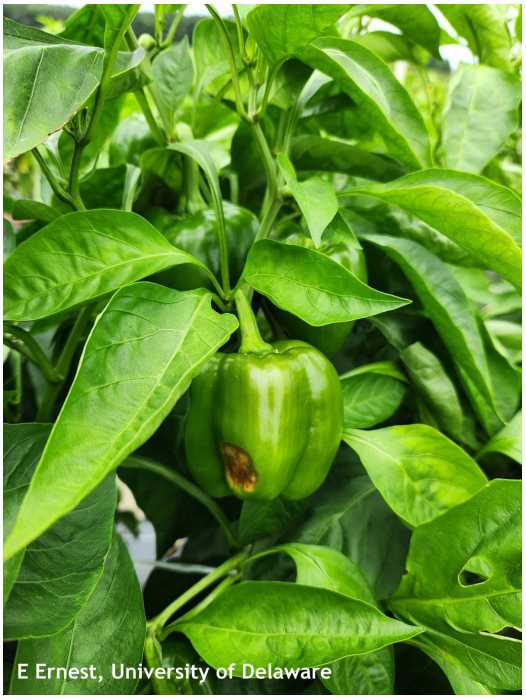


Conditions during flower development affect pepper size and length. Low night temperatures can cause short, unmarketable pepper fruit.

High and low nighttime temperatures are known to impact pepper fruit set, size, and shape. Both high and low nighttime temperatures result in poor pollination which can cause small and lopsided pepper fruit (Figure 1). Night temperatures that are below 64 °F reduce pollination and increase the incidence of parthenocarpic (seedless) fruit. Parthenocarpic fruit tend to be smaller and are likely to be unmarketable. Low night temperatures also cause ovary enlargement during flower development that results in short fruit that do not elongate properly (Figure 2). These short, flattened peppers are also likely to be unmarketable. Longer pepper fruit develop from flowers that form during warm nighttime (68-75°F) conditions. Excessively high nighttime temperatures (90°F) applied to peppers in experimental situations cause fruit set to cease because of damage to pollen; high temperatures do not induce parthenocarpic fruit. The nighttime high temperature threshold for damage to pepper pollen has not been established but is probably higher than the typical night temperatures experienced in Delaware.

Pepper fruit size is also influenced by photosynthate availability during fruit development. The photosynthate availability will depend on plant size, leaf area, and fruit load. Plants that do not reach adequate size before flowering begins will not produce marketable size fruit (Figure 3). Plants that set many peppers at the same time will also tend to produce small fruit because of competition between fruit. To avoid small fruit size, provide adequate nutrients and irrigation early in the season to promote leaf and stem growth in pepper plants. Use of shade cloth in peppers can help to promote early season vegetative growth. Later in the season, damaged, undersize, and

Small pepper plants tend to make small pepper fruit.



Small fruit with sunscald or other types of damage should be removed to reduce competition with potentially marketable fruit. Pepper plants will not naturally abort such fruit.

misshapen fruit should be removed from the plant as early as possible so that they do not compete for resources with fruit that have potential to be marketable (Figure 4). Bell pepper plants tend not to abort fruit that has survived 14 days post pollination, even after significant damage. Pepper fruit that have a short, flattened appearance early in development will not develop a marketable shape later and should be removed. Pepper fruit that have begun to ripen will not grow larger so undersized peppers that begin to change color should also be removed.

Identifying potato tuber diseases

Potato harvest season is happening now! Some fields have been harvested already, other fields have just been burned down, and some later plantings are still sizing up, albeit with some yellowed and diseased foliage after this wet year. There are many diseases that affect potato tubers, so as you begin to sort through your potato harvest this year, take a moment to check for disease symptoms. Proper identification will help you decide which tubers will store well and which should be sold as tablestock, and will give you a better idea of which soil-borne diseases are present in your fields, improving your future crop rotations. To be sure of a diagnosis, samples can be submitted to the UMass Plant Diagnostic Lab. Most of thee diseases (except for scabs, scurfs, and potato virus Y) get started on foliage and, if controlled there, can be prevented on tubers. See the New England Vegetable Management potato disease section for fungicide recommendations.

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

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

Maintaining moist soil conditions, especially during tubet initiation, can be an effective way to prevent scab infections, though is usually tricky to implement on the scale most potatoes are grown. However, in a wet year like this one, perhaps scab is one disease we might see less of!

Some varieties are more susceptible than others, with red skinned varieties being generally most sensitive and russets being most resistant. From Christopher Clark, USDA-ARS Vegetable Breeder, "Some recently released cultivars that are at least partially common scab resistant are Lamoka, Upstate Abundance, and Caribou, though none of these are highly scab resistant. In our very limited trials, Blazer, Canela, and Gold Rush Russet potatoes performed better for common scab resistance than some of the more commonly grown russets when challenged with the species of the pathogen that appears to be the most prevalent in New England. For red potatoes, Dark Red Norland performed the best for scab resistance in some of our limited trials among red potatoes, though it is still quite susceptible. Superior is a white potato that performs reasonably well for scab resistance."

For conventional growers, the fungicide quintozene (Blocker) seems to work quite well.

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

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

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

ally leaving a dark sunken area on the outside of the tuber and internal cavities.

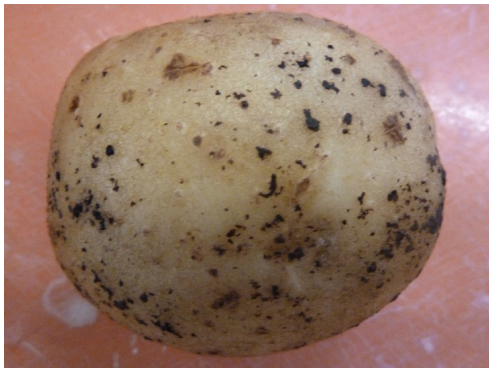
Silver scurf (Fungal: *Helminthosporium solani*) affects only tuber periderm (skin). Lesions start at the stolon end of the tuber as small, pale brown spots which may be difficult to detect at harvest but will continue to develop in storage. In storage, lesions may darken and the skin may slough off.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

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

Silver scurf. Photo: UMaine Extension

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

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



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

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

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

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

Pythium leak. Photo: S. B. Johnson

Late blight (Oomycete: *Phytophthora infestans*) affects potato foliage and tubers. Foliar symptoms start with brown to black, water-soaked lesions on leaves and stems, which produce visible white sporulation at the lesion margins under humid conditions. Whole plants and fields may collapse rapidly. Tuber infection is initiated by sporangia from foliage being washed down into the soil and usually begins in wounds, eyes, or lenticels. Lesions are copper brown, red or purplish and white sporulation may occur on tuber surfaces in storage or cull piles. Infected tubers are susceptible to infection by soft rot bacteria, which can turn entire bins of potatoes in storage into a smelly, rotten mass. (Late blight has not been seen in MA since 2017; there are currently 3 reports of late blight in central NY.)

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

Potato virus Y can cause necrotic ringspots on tubers, depending on which strain of the virus is present, which potato variety is grown, and the time of infection. Affected tubers have roughened rings of darker brown or reddened skin. Necrosis beneath the rings may extend into the tuber flesh. Necrotic symptoms in tubers often increase after storage. Potato varieties vary in their susceptibility to PVY and the symptoms they exhibit on foliage and on tubers; Yukon Gold is particularly susceptible to tuber necrosis. Management of this disease starts with sourcing certified disease-free seed tubers, then preventing spread by aphids by planting buffers around the potato crop.

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

Physiological Disorders

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

Brown center and **hollow heart** are internal physiological disorders of potato that often occur together. Brown center is an area of dead pith cells that turn brown, while hollow heart is a star- or lens-shaped hollow area in the center of the tuber. These disorders make fresh-market tubers unattractive and can reduce repeat sales. Severe hollow heart negatively impacts the quality of chip-processing potatoes and can result in shipments not making grade. Both disorders are related to stress, and occur at a higher incidence when growing conditions abruptly change during the season. Brown center and hollow heart likely form during tuber initiation

Black heart. Photo: North Dakota State Univ.

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

but could also form during tuber bulking. If the disorder occurs during the early part of the season, it most often begins as brown center that forms in the stem-end of the tuber, while late-forming hollow heart usually occurs near the bud-end with no brown center symptoms. Conditions such as soil temperatures below 56°F for 5-8 days, or available soil moisture above 80% initiate brown center formation. Incidence of brown center and hollow heart also increases with periods of stress caused by high or low soil moisture, especially if heavy rains occur suddenly after a dry spell. Large tubers are more prone to develop the disorder, so using closer spacing and avoiding skips in the row can reduce incidence of brown center and hollow heart. There are also differences in the susceptibility of potato varieties to both of these disorders.

--Written by Susan B. Scheufele

News

USDA Transition to Organic Partnership Program

UMass Extension has partnered with NOFA/Mass on the Transition to Organic Partnership Program (TOPP), a new USDA initiative that will invest up to $100 million over 5 years to provide education, technical assistance, and support for producers transitioning to organic. UMass Extension will provide technical assistance and training on topics relevant to those interested in learning more about organic production practices. Keep an eye out here for more information on workshops to come!

UMass Extension continues to support *all* MA growers, organic, conventional, or otherwise. Our educational opportunities as part of this program will be open to all growers interested in learning more about organic production practices.

The TOPP includes a grower mentorship program where certified organic producers can serve as paid mentors and will be paired with a transitioning producer, providing support through the certification process. Transitioning producers receive mentorship at no cost.

For more information on the project, visit https://www.organictransition.org/ and register as a farmer mentor or mentee through the NOFA/Mass website: https://www.nofamass.org/topp/.

Northeast SARE Farmer Grant Program Now Open

The Call for 2024 Northeast SARE Farmer Grants is now available. Approximately $800,000 has been allocated to fund projects for this grant cycle. Awards of up to $30,000 are available, depending on the complexity of a project. The online system for submitting proposals will open on September 15,2023.

Proposals are due no later than 5:00 p.m. EST on November 14, 2023.

Northeast SARE Farmer Grants provide the resources farmers need to explore new concepts in sustainable agriculture conducted through experiments, surveys, prototypes, on-farm demonstrations or other research and education techniques. Projects address issues that affect farming with long-term sustainability in mind.

Farmer Grants are designed to be a strong starting point for farmers interested in pursuing grant funding for projects. Before starting their proposals, potential candidates identify a Technical Advisor who can provide non-farming expertise in areas such as research design, troubleshooting, and promotion. The Technical Advisor acts as a go-to support person throughout the grant project, making it easier on first time grantees and forging new relationships in agricultural communities across the Northeast.

Northeast SARE funds projects in a wide variety of topics, including marketing and business, crop production, raising livestock, aquaculture, social sustainability, climate-smart agriculture practices, urban and Indigenous agriculture and more. Click here to see examples of funded Farmer Grant projects.

Northeast SARE covers the Northeast and Mid-Atlantic states of Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, West Virginia, Vermont, and Washington, D.C

FY2024 Agricultural Food Safety Improvement Program (AFSIP) – Round II

A second round of MDAR's AFSIP Grant has been posted with a due date of **Friday, October 6, 2023**

MDAR is now accepting applications from produce and aquaculture operations who wish to participate in the Department's Agricultural Food Safety Improvement Program (AFSIP). Interested operations are encouraged to review the Request for Response (RFR) on the AFSIP website. If interested in applying, applications must be submitted with any additional documentation by the deadline of Friday, October 6, 2023.

The purpose of the AFSIP grant is to support produce and aquaculture operations in implementing enhanced on-farm food safety measures that help reduce food safety risks and help to minimize microbial contamination and food-borne illnesses. In addition, by implementing eligible upgrades that help reduce a food safety risk, the program helps operations maintain or increase market access. AFSIP is a competitive, re-imbursement grant program that funds projects up to $50,000 or 80% of total project costs.

This round of funding has an application deadline of **Friday, October 6, 2023** and projects must be completed by **June 30, 2024.**

NOTE: For those applicants who have already submitted their applications under the first round RFR-AGR-AFSIP-FY24 you do not need to resubmit. These applications are still under review and applicants will receive notification of their status once awards are finalized.

Applications can be found here: Agricultural Food Safety Improvement Program

Events

In-Person Preventive Controls Qualified Individual Blended Training

When: Monday, September 25, 2023

Where: UMass Amherst

Registration: Register for Part 1 here ($108). Register for Part 2 here ($125).

Need to gear up for Food Safety Modernization Act regulations?

In September 2017, all manufacturers with more than $1 million in annual sales will be required to comply with the Preventive Controls for Human Food regulation of the Food Safety Modernization Act. That means you need a "qualified individual" responsible for writing your Food Safety Plan.

The Food Safety Preventive Controls Alliance has developed a *blended course* that can help reduce the amount of real-time classroom instruction. Instead of taking the 3-day face-to-face course, you can take *Part 1 of the course online*, then attend *Part 2, as a one-day training session*, to complete the Qualified Individual course requirements.

UMass is offering a registration discount to attend the Part 2 program to all small processors by using the promo code **"2023PCQIP2"** for the **Monday, Sept 25, 2023 program.**

BEFORE YOU REGISTER, please ensure you understand the requirements of a blended course participant. For more information, go to: https://www.ifsh.iit.edu/sites/ifsh/files/departments/fspca/pdfs/FSPCA-Preventive-Controls-for-Human-Food-Blended-Course-Information-01-12-2017.pdf

ADDITIONAL NOTES: To attend this one-day training session, you must complete Part 1 of the course online **AHEAD OF TIME** (and bring the Part 1 Enrollment ticket to class). Visit the FSPCA site to learn how to take Part 1 of the blended course (Part 1 fee is $108): https://www.ifsh.iit.edu/fspca/fspca-preventive-controls-human-food#FPCHFBC

Instructor: This course is being taught by FSPCA Lead Instructors trained to teach the FDA-recognized standardized curriculum: Amanda Kinchla, Extension Professor/Food Safety Specialist, University of Massachusetts, Amherst, 413-545-1017, kinchla@umass.edu, http://www.umass.edu/foodsci/faculty/amanda-kinchla.

Cost: Registration for Part 2 is $125.00 per person before Aug 31 for small processors using promo code "2023PCQIP2". The course tuition is traditionally $275. Registration includes course instruction, program exercises, a light continental breakfast, 2 coffee breaks, and lunch. For more information, go to Registration Details for UMass Part 2 Blended Preventive Controls Program, Sept 25, 2023

Twilight Meeting at Heart Beets Farm: Sweet potato production and fall pest management

When: Thursday, September 21, 4-6pm

Where: Heart Beets Farm, 181 Bayview Ave, Berkley, MA 02779

Join UMass Extension to hear about sweet potato production at Heart Beets Farm, and to learn timely info about fall pest management.

1.5 pesticide credits available.

Eastern MA CRAFT Meeting: Geothermal Water Use and Good Agricultural Practices at Farmer Dave's

When: Saturday, October 21, 4-6pm

Where: Farmer Dave's, Dracut, MA

We will take a tour of their solar and geothermal systems and the reuse of the geothermal water for hoop house irrigation. Lisa McKeag from UMass Extension will share about a project the farm is involved in to assess pre- and post-harvest agricultural water quality for food safety. She'll talk about the results of water samples taken at the farm in 2022-23 and give an update on current food safety regulations related to agricultural water.

MDAR Growing Your Farm Business Planning Course

When: Tuesdays, January 9 – March 5, 2024, 6-8:30pm

Where: MDAR office in West Springfield, or alternate western MA location dependent upon interest

Registration: Applications are accepted on a rolling basis. $150 per farm. If interested, please complete the brief Growing Your Farm application and email it to Diego.Irizarry-Gerould@mass.gov, or mail a hard copy to: MDAR, Attn: Diego Irizarry-Gerould, 138 Memorial Ave, Suite 42, West Springfield, MA 01089.

A hands-on course to help established farmers develop a business plan and financial projections for their farm business. This course covers topics including resource assessment, marketing strategy, financial management, risk management, quality of life, and goal setting. The course is taught by a professional business planner with years of experience working with Massachusetts farms and guest speakers on topics such as succession planning and online marketing. Enrollment is open to farmers who have been operating a farm business in Massachusetts for at least the three prior years, but participating farmers could also have 20-30 years of experience and utilize the course to plan for growth or adding a new enterprise. Eight weekly classes will be held in person in West Springfield on Tuesday evenings from January 9th through March 5th, (no class February 20th). The Growing Your Farm course has been approved as a certified USDA Farm Service Agency (FSA) borrower training for financial management.

For more information, see ABTP program webpage or contact Diego at 857-248-1671. It is important to us that course fees do not create a barrier to participation. If the fee would prevent you from participating, please contact Diego at the number or email above and we can discuss waiving the fee.

MDAR Exploring the Small Farm Dream Course

When & Where: Tentative plans are to offer a fall session and/or a winter session. Final determinations for each course session are dependent on sufficient numbers of interested participants.

Fall Session: Wednesdays, November 1 – December 6, 2023, 6-9pm, tentative Western Mass location.

Winter Session: Wednesdays, January 17 – February 14, 2024, 6-9pm, location tbd based on interest.

Registration: $100 for up to two participants per enterprise, as space allows, not due until course location has been confirmed. If interested, please complete the brief application found here: Exploring the Small Farm Dream and email it to Jessica.Camp@mass.gov, or mail a hard copy to: MDAR, Attn: Jessica Camp, 138 Memorial Ave, Suite 42, West Springfield, MA 01089.

This 5-session course provides guidance to aspiring farmers through the decision-making process of whether to start a farm business. Participants will learn about the many aspects of starting a farm business, assess their own skills and knowledge, and get help finding resources for support, including marketing, financing, and regulations. The course

utilizes the Exploring the Small Farm Dream 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.

For more information, see ABTP program webpage or contact Jess at 617-823-0871. If the course fee would prevent you from participating, please contact Jess at the number or email above and we can discuss waiving the fee.

Land for Good's Succession School

Are you thinking about the next steps for the future of your farm? **MDAR** and Land for Good are planning the next Farm Succession School and want to hear from you!

This three-session course provides farmers and partners with structured support to make decisions, engage their families, and organize the next steps for transitioning the farm business to the next owner. It is an opportunity for senior generation farm owners, with OR without identified successors, to talk with peers, learn from advisors, and get support on the process of farm succession and transfer planning.

If interested, fill out Succession School Interest form to help us understand your needs and determine the next course location. Questions, contact Laura Barley at 857-507-5548, Laura.Barley@mass.gov

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Become a sponsor!

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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