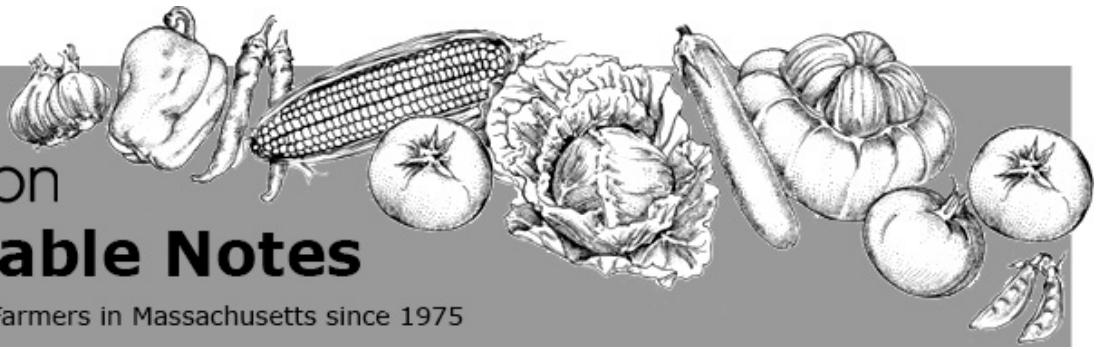




UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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Winter fix-it work begins! Repairing a leak in a barrel root washer at Winter Moon Roots Farm in Hadley, MA. Photo: G. Higgins

agent was previously called *Didymella bryoniae*). Black rot infections begin in the field but may not develop until the crop is brought into storage. This disease is particularly distinctive on butternut, where it causes hard, irregularly shaped, rust-colored and/or white lesions, often with concentric circles (see photo). On other winter squash varieties, as well as pumpkins, black rot causes tissue to become

CROP CONDITIONS

With the first hard frosts this week, a long mild fall comes to an end. Many fall crops can withstand frosts to some extent, if they are not disturbed while frozen. This "[Identifying and preventing freeze damage in fall vegetables](#)" fact sheet from Michigan State University includes information on which crops can withstand which low temperatures, and how to identify frost damage in different crops. Leafy brassica greens, brassica root crops, and spinach are among the most frost hardy crops. Beets, heading brassica crops, and carrots are slightly more sensitive to cold.

Labor shortages continue to affect vegetable harvests, with some unable to harvest planted crops due to a lack of labor, and others unable to harvest now because they didn't have the labor to plant crops during the late-summer. Folks are picking fall staples like leeks, and fall roots crops like carrots, turnips, and rutabagas.

Winter is education season for Extension! We are busy planning winter meetings and presentations and hope to see many of you in-person at some winter events this year. Registration is now open for the New England Vegetable & Fruit Conference, organized by the New England state Extensions, the New England Vegetable & Berry Growers' Association, the Massachusetts Fruit Growers' Association and the Maine Organic Farmers and Gardeners Association. The conference will be online this year, December 13-17. It will consist of one morning (9-11am) and one afternoon (1:30-3:30pm) session each day, and registration will allow you to participate live and give you 3 months of access to the session recordings. We hope you can join us! For more information and registration, visit the conference website at <https://nevbgfa.com/nevfc/>.

PEST ALERTS

[Black rot](#) may be appearing in stored winter squash now. Black rot is caused by three species of the fungus *Stagonosporopsis* (the causal



Black rot on butternut.

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.

water-soaked, then black, and numerous black fruiting bodies develop within the affected tissue. This pathogen can also cause leaf and stem blight in cucurbits—when this occurs, the disease is called gummy stem blight.

It's getting to be the time of year when we begin to see **spinach downy mildew** (DM) appear, both in late field plantings and in high tunnels. Spinach downy mildew is caused by a fungal-like (oomycete) pathogen that produces fuzzy gray sporulation on the undersides of spinach leaves. The first indication of infection may be large yellowing areas visible on the tops of leaves. There are 19 numbered strains of spinach downy mildew, as well as novel strains that don't match any of the numbered strains. Spinach varieties have resistance to different combinations of the numbered DM strains; resistance to novel strains cannot be predicted. The best prevention measures against spinach DM is to grow several spinach varieties, each with as-broad-as-possible DM resistance. If you suspect DM in your spinach, please let us know at umassveg@umass.edu or (413) 577-3976 so that we can have the strain identified to help inform management of this important disease across the region.



Spinach downy mildew on underside of spinach leaf.
Photo G. Higgins

Winter cutworms are beginning to cause feeding damage in high tunnel spinach. Variegated and black cutworms and yellow-striped armyworm have also been found feeding in winter high tunnels in the region in recent years. Cutworms are nocturnal and hide beneath the soil or under leaves during the day, so often their ragged feeding damage is seen while the caterpillars are not. Growers have reported that Bt materials (e.g. XenTari, Dipel) are somewhat but not fully effective; spinosad (e.g. Entrust) may also be effective and another option for organic growers. Conventional materials including carbamates (Sevin, Lannate) pyrethroids (Baythroid XL, Mustang Maxx), IRAC Group 18 materials (Intrepid 2F, Confirm 2F), Torac 15EC (Group 21A), Avaunt (Group 22), and Prev-Am (Group 25) are labeled for control of other caterpillar species in spinach and can be used in high tunnels.



Winter cutworm color progresses from green to brown as they mature.
Photo G. Higgins

Tomato brown rugose fruit virus (ToBRFV) was diagnosed in greenhouse tomatoes in Hampshire Co. this fall. This virus is an emerging disease of greenhouse worldwide, with several outbreaks occurring in Israel, North America, Europe, and Asia since 2014. Foliar symptoms of ToBRFV on tomato and pepper include deformed, crinkled leaves, mosaic, mottling, flecking, chlorosis, and/or necrosis. Fruit symptoms include discoloration and rough brown patches or ringspots. Symptom expression can vary widely among tomato cultivars. This virus is easily transmitted by mechanical means (primarily human activity in greenhouses). The scope and impact of ToBRFV in New England is not yet known—if you suspect ToBRFV on your farm, please contact us at umassveg@umass.edu or (413) 577-3976 so that we can monitor this emerging disease.



Tomato brown rugose fruit virus symptoms on leaves and fruit.
Photo: <https://www.fdas.gov/content/download/83755/file/pest-alert-tomato-brown-rugose-fruit-virus.pdf>

WEED MANAGEMENT ADVICE: CONTROLLING WEED SPREAD AND WEED MAPPING

The latest issue of Cornell Cooperative Extension's Veg Edge newsletter included a brief article by Lynn Sosnoskie on moving weed seeds on field equipment—we thought it was interesting and had some good, practical recommendations for preventing the movement of weed seeds. You will notice that the article is tailored toward agronomic crops and equipment (e.g. combines), but the information and recommendations are still quite relevant for vegetable farmers and other farm equipment types.

Of course, in order to know if you have brought a bunch of new seeds into a field on equipment, you have to first be familiar with the weeds present in your fields. We are combining Dr. Sosnoskie's article with some recommendations on end-of-the-year weed scouting from Rich Bonanno, former UMass Extension Weed Specialist.

AVOID CREATING NEW WEED PROBLEMS WITH HARVEST & CULTIVATION EQUIPMENT

--Written by Lynn Sosnoski, Assistant Professor in Weed Ecology and Management for Specialty Crops, Cornell Agri-Tech; edited by Christy Hoepting, CCE Cornell Vegetable Program; adapted by the UMass Vegetable Extension Program

Weeds can interfere with crop growth and development both directly, via competition for water, nutrients, and light, and indirectly, by physically interfering with farming tasks. Weeds that escape in-season control often produce significant quantities of seed, which are threats to future yields.

While most seed will be deposited in the same field in which it was produced, some may be transported between sites on farm equipment. In some parts of the US, university personnel have found that harvesters are a significant source of seed dispersal for important weed species, such as herbicide resistant biotypes of Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*Amaranthus tuberculatus*). In New York State, herbicide-resistant waterhemp seeds were recovered from a combine that was recently acquired from an out-of-state grower. Ultimately, the careful examination of this harvester may have prevented the establishment of a difficult-to-control weed with a novel resistance profile.

While it may not always be feasible to thoroughly clean equipment between every field, removing as much plant debris as possible before transferring farm equipment between sites is a valuable strategy for controlling weed spread. Here are some other tips for reducing the movement of unwanted seeds:

- Newly purchased, previously owned equipment should be inspected to prevent new weed species or weedy biotypes from being introduced.
- Avoid harvesting overly dense patches of weeds, especially if you suspect herbicide resistance
- Arrange harvest operations to ensure that the weediest fields are harvested last, when possible.
- While it may not be feasible to thoroughly clean equipment between every field, removing as much plant debris as possible before moving harvesters between sites can be a valuable strategy for controlling weed spread.
- Remember that unwanted seed can also be picked up and spread on tires and on tillage and planting equipment. Remove clumped soil from implements and tractors to avoid spreading weed seeds (as well as devastating soil-borne



Bindweed caught in cultivating equipment. Photo: L. Sosnoskie



These weed seed seedlings, predominantly common lambsquarters, are germinating from soil that was collected off of disc harrows at the Cornell AgriTech farm in Geneva. Photo: L. Sosnoskie

pathogens).

- Be strategic with site selection when conducting end-of-season equipment clean-outs; choose a location where dislodged or removed seed cannot be easily blown, picked up, washed away, or otherwise transported back to fields. The removal of debris may have additional economic benefits if it prevents unnecessary wear-and-tear and helps to preserve equipment functionality over time.

For more information, see the following links:

- [End-of-Season Combine Clean-Out Fact Sheet](#) – North Dakota State University
- [Weed Seed Movement via Combines](#) – University of Wisconsin-Madison Extension
- [Weed Seed Management at Crop Harvest](#) – University of Wisconsin-Madison Extension

END OF YEAR WEED SCOUTING

--Written by Rich Bonanno, former UMass Extension Weed Specialist, now Associate Dean, CALS and Director, NC State Extension

It is worthwhile to take the time to check fields for weed problems as the field season ends. Scouting can identify problems that will be expensive to solve if they get out of control, and can provide clues that will help in designing a weed management program for next year. Mapping weedy spots, and keeping some kind of permanent record of weed surveys, can help you evaluate your weed management over the years. Make a map of each field and fill in the following information:

How many? If weeds are very dense, they may be having an impact on yields. This is especially true if these weeds emerged early in the season, when competition is greatest. If weeds were actively growing during the period of greatest crop growth, consider changing the weed management program.

Which weeds? Proper weed ID can help you to identify potential problems before they get out of hand, and can help you decide if you need to modify your weed control program. It will help to have a good field guide around to help identify weeds in the field—we recommend “Weeds of the Northeast” by Uva, Neal, and DiTomaso.

Weeds like yellow nutsedge, field bindweed, and quackgrass are spreading perennials that have underground parts that enable them to spread throughout whole fields. Because these weeds can be very damaging and are very difficult to control, they are worth investing more time and resources into controlling when they are young or appearing in a field for the first time. In addition, keep an eye out for annual weeds that are new to a field or are increasing in numbers. Some weeds can be very difficult to control in some or all of the crops in your rotation. Galinsoga, for example, is hard to control in brassicas, peppers, and squash. Nightshades are difficult to control in tomatoes and other solanaceous crops for growers who rely on herbicides because they are all in the same family. Velvetleaf is hard to control in sweet corn. To learn more on understanding weed lifestyles check out our article [Understanding Weed Life Cycles: The Key to Better Management](#).

Where are the weeds? Weeds in the rows or planting holes are much more damaging to crop yields than between-row weeds. Weeds in rows may be an indication that cultivation equipment needs adjustment, or cultivation needs to be done earlier.

What worked? It is also useful to look at the whole field and evaluate the effectiveness of your weed control efforts. If some weeds are generally escaping, identify them. They may point to weaknesses in your herbicide or cultivation program. If mostly grasses or mostly broadleaves are escaping, it may require an adjustment of either the rates or the timing of grass or broadleaf herbicides. The New England Vegetable Management Guide contains [a chart listing the effectiveness of vegetable herbicides](#) on most of the common weeds in New England. Use this guide to find an herbicide labeled for your crop that might give better control than the one that was used.

THE CLIMATE ADAPTATION FELLOWSHIP: ADDRESSING CLIMATE CHANGE IN THE NORTHEAST

In recent years, western and southern US states have seen dramatic evidence of a changing global climate—record-breaking wildfires spanning the West Coast and increasingly destructive hurricanes along the Gulf of Mexico. But did you know that the Northeast region of the United States is warming faster than anywhere else in the country? Within the US, our region has also seen [the largest increase](#) (see page 20) in the intensity and frequency of precipitation events, interspersed with longer periods of sustained drought.

To farmers, these trends have already started to become evident. This past July was the wettest July ever recorded in Massachusetts. During this same period last year, the state was in significant drought. Of course, these extremes make growing vegetables and planning from year to year extremely difficult. Many growers are attempting to adapt to changing conditions and increased weather variability by trying new practices meant to buffer some of this unpredictability and manage new challenges.

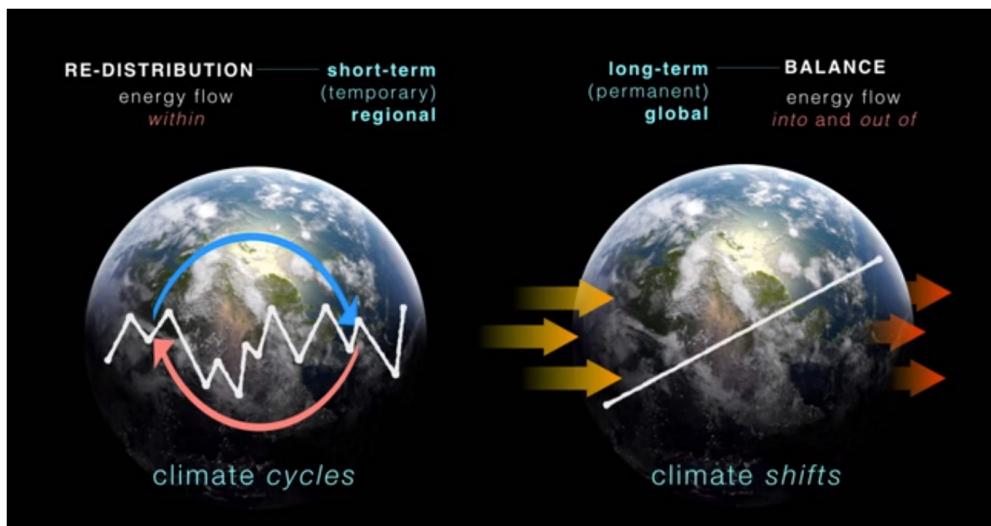
A team of collaborators from University Extension programs and the USDA created a curriculum and peer-to-peer learning program, the [Northeast Climate Adaptation Fellowship](#), to help farmers and farm service providers in the Northeast region work together to increase understanding of the science of climate change and the tools we'll need to both lessen it and live with it.

This was the first year of the Fellowship and I was fortunate to be among the initial cohort of fellows. The program started in January 2021 with a weeklong series of workshops that began with an overview of the physics behind climate change and the scientific data that overwhelmingly supports the idea that the Earth's climate is warming. The sessions then covered how climate change is affecting farms in the Northeast and described some of the tools available to help farmers adapt. We also talked about the role farmers can play in reducing emissions, and finally, how to talk about all this productively with our peers and colleagues. This curriculum provided the foundation for the real work of the fellowship—pairing (or trio-ing) into service provider-farmer teams to assess each farmer's climate risks and adaptation goals. This assessment then informed a trial or demonstration of a new or modified practice over the course of the season.

The basic science, and global and local impacts

Energy flows both within the Earth—leading to short-term, regional and seasonal climatic cycles—and into and out of the Earth's system—leading to long-term, global climatic shifts (see Fig. 2. Image captured from Utah State University [Climate Change Essentials Course](#)). When energy from the sun's light enters the Earth's system, the Earth absorbs the light and warms, emitting its own light that carries energy away from the planet. You can think of this as an energy budget and when the energy entering and the energy leaving are balanced, the temperature is stable. Because of a build-up of greenhouse gases in the atmosphere, primarily carbon dioxide, nitrous oxide, and methane, energy that used to leave the Earth's system is being trapped in the atmosphere. This excess energy is remaining on Earth as heat, leading to instability in the system and a generalized warming of the planet. Because of the energy flows within Earth's system, these changes are happening at variable rates and to different degrees across the globe. The entire globe is warming; some parts are warming faster than others.

The principle cause of this accumulation of greenhouse gases can be attributed to the burning of fossil fuels.

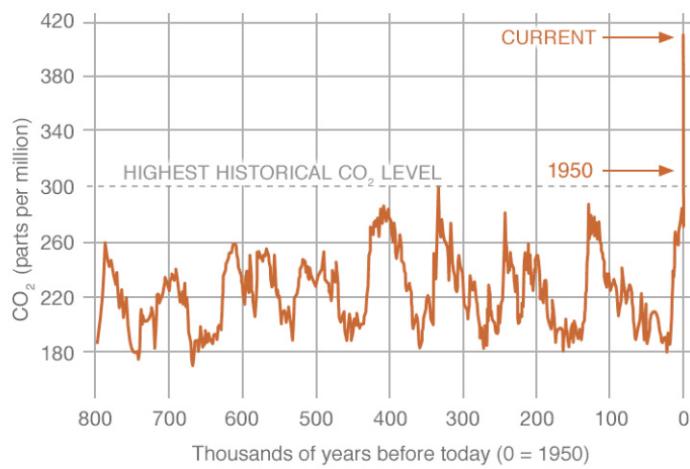


Energy flows both within Earth and into/out of the planet creating short-term climate cycles and long-term climate shifts. Image: Robert Davies, et al. from Utah State University Extension Climate Change Essentials course.

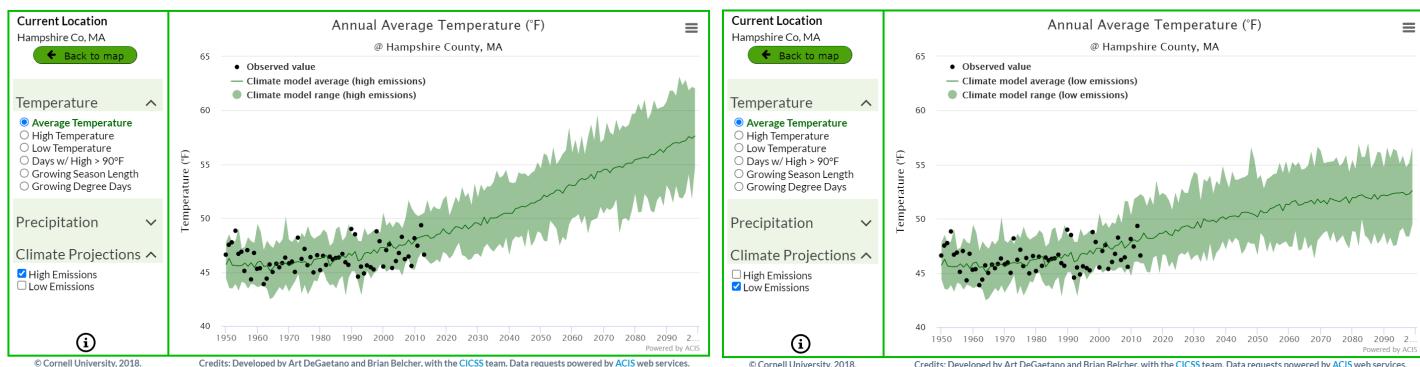
We can directly measure the carbon dioxide (CO_2) in the atmosphere and measurements demonstrate that levels have been [steadily increasing since the middle of the twentieth century](#) (proxy measurements from ice cores show that CO_2 levels since 1950 are higher than they have been over the last 3 glacial cycles, see figure at right). The carbon isotopes from burned fossil fuels have a detectable signature that is different than that of the carbon that is a part of the carbon cycle that has been continuously moved through plants, humans, soil, and the atmosphere. Understanding this, scientists have determined that the excess carbon measured in the atmosphere is from the carbon released by the burning of fossil fuels. The most recent [Assessment Report from the Intergovernmental Panel on Climate Change \(IPCC\)](#) released in August 2021 stated that “[i]t is unequivocal that human influence has warmed the atmosphere, ocean, and land”.

The effects around the globe of the warming caused by these emissions probably sound familiar to most people at this point—loss of sea ice, rising sea levels, heat waves, intense storms, and periods of drought. These effects are already occurring and will continue to occur to different degrees and at different rates in different regions. **In the Northeastern US, the trend is toward increased and more intense precipitation, sea level rise, and warmer temperatures with a longer growing season and decreased winter snow and freezing.**

Modeling based on historic trends and current emissions trajectories can help to show us what to anticipate and how our behavior and decisions now are likely to lead to different outcomes. The IPCC considered five different scenarios in its projections, from one where emissions are drastically cut in the near-term to one where we remain on our current high-emissions path. Under all scenarios, global temperatures will continue to increase over the next three decades and current targets that limit warming to 1.5-2 °C will be exceeded by mid-century unless drastic emissions reductions are made before then ([IPCC Summary for Policymakers](#), pg. 14). The [Climate Smart Farming Tool](#), developed by Cornell University,



CO_2 levels in Earth's atmosphere since 1950 have vastly exceeded levels previously seen over the last 3 glacial cycles. Image: NASA



The Cornell Climate Smart Farming Tool allows users to view climate data for any county in the Northeast with projections given for both “high” and “low” greenhouse gas emissions scenarios. Image: Cornell University Climate Smart Farming Tool

provides localized projections for the Northeast, by county. The tool (pictured at right for Hampshire County, Massachusetts) shows expected climate effects under either “high” or “low” emissions.

The role of agriculture

Agriculture, broadly, has been recognized as both a driver of greenhouse gas emissions and as having the potential to help reduce greenhouse gases in the atmosphere through practices that, for instance, sequester carbon in the soil. Nationally, [the agricultural sector accounts for 10% of all greenhouse gas emissions](#), primarily through soil and livestock management practices. Agricultural production is also particularly sensitive to climatic changes. Producers, plants, and animals are all at risk of increased heat stress under increasing temperatures; excess rainfall or lack of rain for extended periods

make crop production difficult; changing pest life cycles and a lack of pest-killing freezes make crops more susceptible to damage. Agriculture, therefore, is a key area of focus for the development and adoption of strategies to both **mitigate** and **adapt** to a changing climate. (Mitigation strategies are those that help to reduce the amount of greenhouse gases and reduce atmospheric warming. Adaptation strategies are those that help to lessen climate change's effects by allowing systems to better cope with changing conditions.)

The Northeast Climate Adaptation Fellowship

The Northeast Climate Adaptation Fellowship is centered on addressing the current trends and projections for our region by applying available, locally-informed, and scale-appropriate tools to help farmers prepare their operations for a changing future. Many of these adaptive strategies may have mitigation benefits as well (e.g. increasing use of cover crops as an adaptation strategy to reduce erosion from increased heavy rainfall events will also serve as a mitigation factor by increasing carbon sequestration).

The process used by the Northeast Climate Adaptation Fellowship was based on the one outlined in [USDA's Adaptation Resources for Agriculture](#). This document, targeted to the Midwest and Northeast, provides a framework for evaluating a particular farm's climate-related risks along with a menu of adaptation strategies to address the identified risks. For instance, for a farm susceptible to flood damage and saturated soils, suggested tactics include shifting to more flood-tolerant varieties or installing tile drainage. Farms vulnerable to excess wind might consider installing windbreaks or hedgerows. The resource then describes a process for monitoring the effectiveness of adopted strategies and assessing the costs and benefits.

For the fellowship project, we used this framework to assess the climate risks and adaptation goals of a local farm. I was teamed up with Abby Ferla at [Foxtrot Farm](#) in Ashfield, MA along with Alan Baker, a Master Gardener from Vermont. Foxtrot Farm is small-scale certified organic farm that grows annual and perennial herbs, flowers, and annual vegetables. Abby's farm is relatively young and she founded it with an understanding of our planetary predicament in mind. The farm sits at the top of a hill with no available water for irrigation, so Abby is reliant on increasingly variable precipitation for all of her crops' water. There is a permanent bed system and crops and varieties are selected for, among other things, their potential to be resilient in the face of a changing climate and may be more tolerant than other more commonly-planted varieties to drought conditions. The farm tends to be wet in spring but can get quite dry later in the season, particularly in a dry year. In conducting our assessment of the farm's potential climate risks, we discussed long-term solutions to the water availability issue like installing a well or a rain catchment system. In the short-term, Abby was interested in understanding soil moisture levels on the farm and looking at some different practices to see how they might help with soil moisture management, both when water is plentiful and when it is scarce.

We designed a non-replicated demonstration trial to look at the effect of different pathway mulches on soil moisture in beds of calendula, one of the farm's main crops. In a follow-up article, I'll describe the trial design and implementation in more detail and discuss the data we collected.

--by Lisa McKeag, UMass Vegetable Program

PHOSPHORUS MANAGEMENT FOR VEGETABLE FARMERS

Soil phosphorous content and phosphorous pollution is a concern for many vegetable growers, especially those that also raise cows or are farming on land previously used by a dairy farm. UMass Extension hosted a [symposium in 2016](#) with experts and professionals from throughout New England in order to gain a better understanding of why New England soils may have high phosphorous (P) and how to best manage that land to avoid P pollution. We learned that P supply and demand are unevenly distributed across the US, with New England being a net importer of P in the form of fertilizer and feed (human and animal). The excess P then stays in our area as manure. We can improve P management by using local sources of food, animal feed, and fertilizer, rather than importing it from other areas. Highlights from the symposium about soil phosphorus dynamics, soil testing and interpretation, and P mitigation strategies are included here to help growers take some practical steps toward improved P management.

Soil Phosphorus Dynamics

Phosphorous pollution is largely a concern due to the high potential to cause water pollution. When P leaches into water-

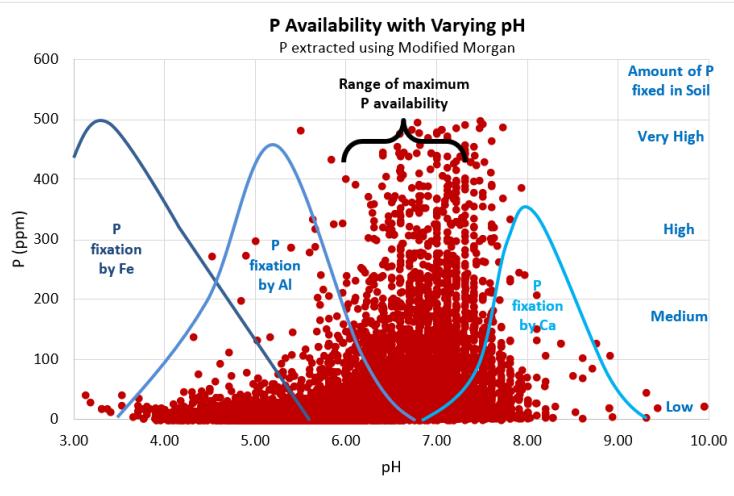
ways, it is harmful because it dramatically increases nutrient levels, causing algae and aquatic plants to grow rapidly, and decreasing the amount of dissolved oxygen in the water. This process – called eutrophication – makes waterways less habitable for aquatic animals. P runoff can also cause toxic algae blooms that are harmful to aquatic life as well as humans. The concentration of soluble P needed for the growth of agronomic crops is about 0.2 ppm; by comparison, aquatic plants only need 0.02 ppm to grow and cause eutrophication of a body of water.

So how does P get into bodies of water? The answer is related to the different forms of P that can be present in soil.

Organic P is P that is part of carbon-containing molecules. Organic P is the form of P that is present in organic matter, and is the primary form of P in manure.

Soluble P is orthophosphate, which dissolves in water and is the form of P that is taken up by plants. Soluble P is often called “available inorganic P”. When added to the soil, soluble P reacts with soil particles and minerals and becomes less-soluble.

“Fixed”, or “bound” P is inorganic (meaning it is part of compounds that do not contain carbon) and is largely not available for plant uptake. P becomes fixed when it binds to iron, aluminum, calcium, or magnesium in the soil, see figure at right. Some fixed P is only loosely bound to soil particles—when plants take up soluble P, some of the loosely bound P detaches to replace the soluble P in the soil water. Compared to other major nutrients, plants require relatively less P, so once P becomes fixed, it often takes a long time for it to become available again.



Phosphorous cycles through forms throughout its time in the soil. Organic P is slowly broken down into soluble, plant-available P by microorganisms—this process is called mineralization. Microbial activity, and therefore the speed of P mineralization, is affected by temperature, moisture, and soil fertility. If soluble P is not taken up by plants, it may either bind to soil particles (thus becoming fixed) or be leached into groundwater. Leaching of P is not usually a problem, because the soluble P will bind to soil particles as it moves down through the soil profile. However, sandy soils have a lower capacity to hold P so some leaching can occur in coarsely grained soils. P leaching may also occur in finer textured soils, due to channelized flow of surface water down through the soil. P leaching is of special concern in fields with tile drainage.

Phosphorous pollution primarily occurs when soluble or fixed P is eroded from soil by water or wind. P is added to soils in the form of fertilizers (primarily in the form of soluble P) or soil amendments (e.g. manures, composts, biosolids, cover crops). Organic P makes up most of the P in manure, but manures still contain much more soluble P than is held in the soil. If fertilizer or a high-P soil amendment is spread on soil and then it rains, the soluble P in the amendments can dissolve and be washed away. Fixed P can be washed away on soil particles when soil erosion occurs.

Phosphorus becomes a threat to the environment when there is a combination of source AND transfer – meaning soil P content needs to be high AND there needs to be high potential for that P to move into surface water. For example, there is high risk of P transfer from P applications to frozen ground, on slopes greater than 7%, or within 25 ft. of a water source. In these scenarios, a field with low or below optimum P levels may still pose a P pollution threat. Spreading compost or manure onto a field in the fall without incorporating or without a cover crop also increases risk of P pollution. Without incorporation, little of the soluble P in the amendment will bind to soil particles, and without a cover crop, little P will be taken up by plants, leaving most of the soluble P on the soil surface, susceptible to runoff from snow melt in the spring. Soils with above optimum P are not a threat to the environment if there is little overland water movement or soil erosion. Keeping a living ground cover is your best protection against P pollution.

Phosphorus Testing and Interpretation

Monitor soil P levels by taking soil samples at the same time every year. If soil P levels are increasing over time, that indicates that more P is being applied than is being removed by crops. There are several different methods for extracting P

from soils, which are offered by different soil testing labs in the Northeast.

Modified Morgan extraction reflects the nutrients that will be available in one growing season – it includes nutrients that are dissolved in soil water, adsorbed to mineral surfaces, and in organic matter that will decompose that year. This method is considered the most accurate soil analysis method for New England's generally acidic soils; it has been widely used to conduct nutrient management studies and correlate crop yield to fertility amendments in our region. This is the standard test used by the UMass, UMaine, UVM and UConn soil testing labs. Note about UMass P analyses: In 2012, UMass updated our soil P interpretation guidelines so that soils with >14ppm P using the Modified Morgan extraction would be categorized as “above optimum” and would generally not result in a recommendation to amend with P that year. Previously, the threshold above which no further P amendment was recommended was 26ppm. This change was based on research on the potential for P leaching and on data showing that crops do not require more than 14ppm P to achieve maximum yields. Therefore, you may have seen a change in interpretation of test results that were not due to any change in your farming practice.

Water Extractable P: Water extractable P measures soluble P and is a useful analysis for determining the immediate risk of runoff when testing organic residuals (e.g. compost* or biosolids). Water extractable P represents the P that is available at the time of application for plant uptake (or potential runoff). Water extractable P can be measured as a part of compost or manure analyses. *Note: The UMass soil lab no longer offers compost analysis but below are labs that offer testing services discussed in this article.

Total Phosphorus: Most labs, including UMaine and UMass, also offer one of the EPA methods (3050 or 3051) for “total labile P”. Labile P is P in all chemically reactive forms, attached to soil particles – both available and fixed. These methods use boiling concentrated nitric acid and hydrochloric acid to destroy all organic matter, and strip all aluminum and iron surface coatings. Sand, silt, and clay particles are left intact. This is usually a regulatory method to quantify the total pool of reactive P in soil and eroded sediment. Much of this total P will remain permanently or semi-permanently unavailable to plants in the field.

UMass Soil and Plant Nutrient Testing Laboratory

Services: Modified Morgan

Web: <http://soiltest.umass.edu/>

Phone: 413-545-2311

Email: soiltest@umass.edu

UConn Soil Nutrient Analysis Laboratory

Services: Modified Morgan

Web: <http://www.soiltest.uconn.edu/>

Phone: 860-486-4274

Email: soiltest@uconn.edu

UVM Agricultural and Environmental Testing Lab

Services: Modified Morgan, manure

Web: https://www.uvm.edu/pss/ag_testing/

Phone: 802-656-3030

Email: AgTesting@uvm.edu

Dairy One

Services: Modified Morgan, manure

Web: <http://dairyone.com/>

Phone: 1.800.344.2697 or 607.257.1272

Email: mark.joyce@dairyone.com

UMaine Analytical Lab and Soil Testing Service

Services: Modified Morgan, manure, compost, TP and WEP

Web: <https://umaine.edu/soiltestinglab/>

Phone: 207.581.2945

Email: hoskins@maine.edu

Penn State Agricultural Analytical Service Lab

Services: manure, compost, TP and WEP

Web: <http://agsci.psu.edu/aasl>

Phone: 814-863-0841

Email: aaslab@psu.edu

Spectrum Analytic

Services: Modified Morgan, manure

Web: <http://www.spectrumanalytic.com/>

Phone: 1-800-321-1562

Email: info@spectrumanalytic.com

Phosphorus Mitigation Strategies

Symposium attendees came up with quite a few creative P mitigation strategies during round table discussions. Here are some that are applicable to vegetable growers:

- Identify areas on the farm where there is a large source of P *and* high risk of transport. Prioritize developing a P mitigation strategy for these fields.
- When using organic residuals (e.g. manures, compost), it is easy to over-apply P when trying to meet a crop's N demands due to the low ratio of N:P in the materials. To avoid this, have these materials tested to determine their P content before applying and apply based on crop P needs. Then use an N-based fertilizer such as urea or alfalfa or soybean meal to meet the crop's N needs.
- Do not surface apply organic residuals such as manure or compost before heavy rain.
- You may be hesitant to stop applying P altogether, even if soil test P levels are above optimum. If so, experiment with lower P applications by leaving it off of a few hundred row feet of crop, especially in early spring plantings and then monitor yields to determine the effect.
- Take measures to reduce soil compaction—avoid driving on waterlogged fields, subsoil to break up plow pans.
- Convert areas of highest risk for P transport to buffer strips, or surround highest risk areas with buffer strips.
- Make banded rather than broadcast applications of P-containing materials whenever possible, and incorporate material to 2 inches below seeding depth to allow roots to grow down to meet the P.
- If P-containing residual or fertilizer is applied, either incorporate to increase mineral binding or apply to a planted cover crop to reduce potential soil erosion.
- Use low-P sources of organic residuals such as leaf mulch compost instead of food waste or manure-based compost. Poultry litter and pig manure have the highest P-content of compost-based fertilizers because those animals lack an enzyme which stabilizes P; ruminants have this enzyme.
- To maximize P removal from a field, grow a high yielding crop such as corn and remove crop residues after harvest.
- Use ‘hyperaccumulator’ cover crops like mustard, Johnson grass, corn and sorghum, or alfalfa to take up P from the soil, then remove and compost the material or feed it to animals to recycle the P.
- Manage soil pH to a range between 6.5-7.2, as P is most available to plants in this range. Then get a soil test and amend with P afterwards, only if needed according to the crop and test results.
- Conduct a [whole-farm nutrient balance worksheet](#), making sure to credit all sources of P including from organic residuals and cover crops. This process is most useful for mixed animal and forage crop farms but can be applicable to vegetable farms importing manure and/or compost. This program is available through Cornell’s Nutrient Management Spear Program—see more at the link above.
- Conduct a risk assessment using the [Phosphorus Index](#). The P-Index is a tool that generates a score for a given field that rates the relative risk of P runoff from that field. The score is based on information about soil erosion, manure and fertilization plans, as well as soil test results and site visits. The tool also provides recommendations for lowering your P-Index score (and therefore the risk of P runoff). Contact your [local NRCS office](#) for help with conducting the P-Index analysis.
- Maintain regular soil testing practices using the Modified Morgan for soils and ask manure and compost suppliers for analyses of those organic residuals.
- Reduce the amount of P that is imported into our region and onto our soils by using local sources of organic residuals rather than purchasing P fertilizer. Organic residuals such as compost have the added benefit of increasing soil organic matter and water holding capacity which will also reduce P runoff.

Thanks to Dr. Jennifer Weld and Dr. John Spargo of Penn State University, Dr. Amy Shober of the University of Delaware, and Ned Beecher of the Northeast Biosolids and Residuals Association.

-Written by K. Campbell-Nelson and G. Higgins. Edited for 2021 publication by Bruce Hoskins, UMaine Soil Lab

NEWS

NEW FEDERAL CROP INSURANCE POLICY FOR SMALL FARMERS

For the 2022 crop year, a new Federal Crop Insurance policy will be available for producers with small farms that sell locally. The new policy, called the Micro Farm Policy, simplifies recordkeeping and covers post-production costs such as washing and value-added products.

The Micro Farm Policy is offered through the Whole Farm Revenue Protection (WFRP) policy but with distinct provisions that do not require expense or individual crop reporting, significantly simplifying recordkeeping requirements for producers. Revenue from post-production costs, such as washing and packaging commodities, are considered allowable revenue whereas these post-production costs are not allowable revenue under a traditional WFRP policy.

The Micro Farm Policy is available to producers who have an operation that earns an average allowable revenue of \$100,000 or less, or for carryover insureds, an average of \$125,000 or less.

Deadline to purchase a Micro Farm Policy is March 15, 2022, but bear in mind that if you have an existing CAT policy on an insured crop, you must cancel that CAT coverage or upgrade to a “Buy-Up” policy by the sales closing date for the insured crop. Important Note: While the deadline to purchase a Micro Farm Policy is March 15, 2022, protection does not begin until the private crop insurance company accepts the Micro Farm Policy. This is an important consideration if you grow perennial crops. As an example, if you purchase a WFRP policy and it is accepted by the private insurance company on March 1, you are covered for events after that date. Any weather-related events that caused damage to your perennial crops prior to that date would not be covered!

Producers interested in the Micro Farm Policy are encouraged to contact a private crop insurance agent. A list of crop insurance agents can be found at: <https://prodwebnlb.rma.usda.gov/apps/AgentLocator/#/>

This is material is based upon work supported by USDA/NIFA under Award Number 2018-70027-28588 and Award Number 2018-70027-28584. UMass Extension works in partnership with the USDA National Institute of Food and Agriculture and the Northeast Extension Risk Management Education Center to educate Massachusetts and New England producers about Federal Crop Insurance and USDA Disaster Assistance Programs. For more information, please contact UMass Risk Management Educators Paul Russell at pmrussell@umass.edu or Tom Smiarowski at tsmiarowski@umass.edu.

GRANT DEADLINES COMING UP SOON!

[Massachusetts Agricultural Food Safety Improvement Grants](#): Due TOMORROW, Friday, November 5, by 4:00pm

[Massachusetts Food Security Infrastructure Grants](#): Due Sunday, November 7, by midnight.

[Northeast SARE Farmer Grants](#): Due Tuesday, November 16. More information below

[USDA Pandemic Response and Safety Grants](#): Due Monday, November 22. More information below.

NORTHEAST SARE FARMER GRANTS: APPLICATIONS DUE NOVEMBER 16

Farmer Grants are for commercial producers who have an innovative idea they want to test using a field trial, on-farm demonstration, marketing initiative, or other technique. Farmer Grant projects should seek new knowledge other farmers can use and address questions that are directly linked to improved profits, better stewardship, and stronger rural communities. A technical advisor, often an Extension agent, crop consultant, other service professional, or farmer with advanced expertise, must also be involved. Projects should seek results other farmers can use, and all projects must have the potential to add to our knowledge about effective sustainable practices.

Proposals are due by **5pm ET on Tuesday, November 16, 2021**. [More information can be found here](#).

PANDEMIC RESPONSE AND SAFETY GRANT PROGRAM: APPLICATIONS DUE NOVEMBER 22

The [Pandemic Response and Safety Grant Program](#) provides grants to food processors, distributors, farmers markets, and producers to respond to coronavirus, including for measures to protect workers against COVID-19. Funds will be used to issue grants for costs incurred between January 27, 2020 (the date upon which the public health emergency was declared by U.S. Department of Health and Human Services), and December 31, 2021. Grants will cover the activities associated with workplace safety, market pivots, retrofitting facilities, transportation, worker housing, and medical services in response to COVID-19. In this first round of PRS funding, USDA is targeting support to small businesses. Follow [this link](#) to see if your business qualifies as a “small business”.

The first step in applying for this grant is to apply for a DUNS number, which can take several days, so we encourage

you to start this process as soon as possible if you are interested in applying.

Applications due **11:59 PM Eastern Time on November 22, 2021**.

For more information, see the PRS Program website: https://usda-prs.grantsolutions.gov/usda?id=usda_index.

EVENTS

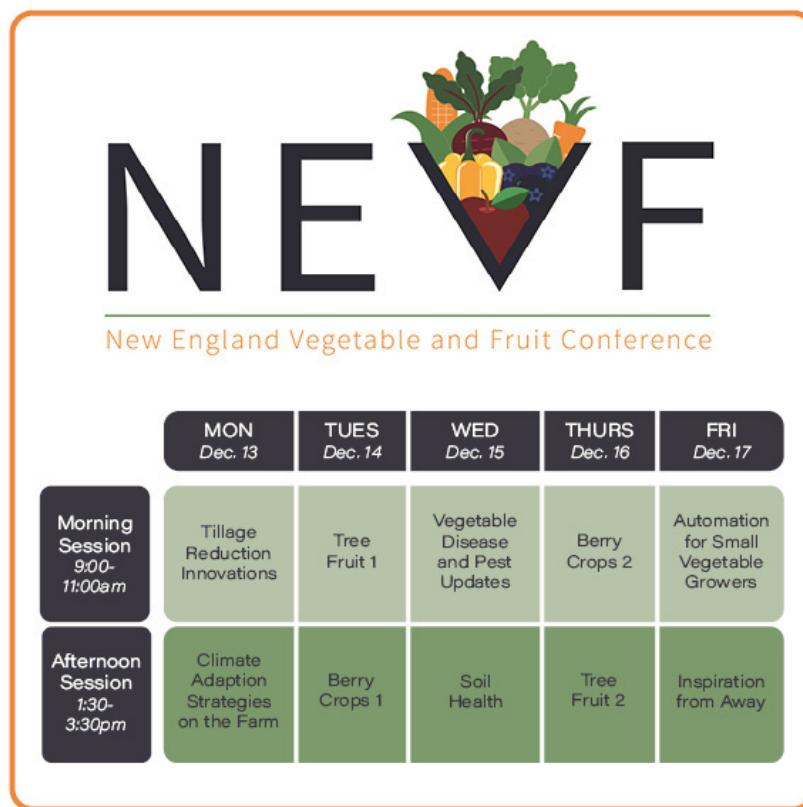
REGISTRATION NOW OPEN! NEW ENGLAND VEGETABLE & FRUIT CONFERENCE 2021 IS ONLINE

When: Monday – Friday, Dec. 13 – 17, 2021

Registration: \$50 registration fee gains you full access to the program and 3-months access to the recordings.

Join for 5 days of presentations, designed with the zoom-fatigued farmer in mind. The conference will be comprised of a morning (9-11am) and afternoon (1:30-3:30) session every day. Session topics include: Tillage Reduction and Innovation, Tree Fruit 1 & 2, Berry 1 and 2, Vegetable Disease and Pest Updates, Automation for Small Vegetable Growers, Climate Adaptation Strategies on the Farm, Soil Heath, Inspiration from Away. Co-sponsored by the New England and Eastern New York State Cooperative Extensions, MFGA, MOFGA, and NEVBGA.

For more information, including registration information, visit the conference website, <https://nevbga.com/nevfc/>, or click the button below to register.



[Click here to register for the Conference](#)

NOFA/MASS WINTER CONFERENCE

When: Saturday-Sunday, January 15-16, 2022, 9am-6pm

Registration: \$45-250 sliding scale. Scholarships available. [Click here to register.](#)

Join your peers in the organic, regenerative, sustainable living movement at the NOFA/Mass Winter Conference this

January. Gain access to presenters and information that keeps you on the pulse of the latest developments, insights and innovations happening on the farms and gardens of your local region as well as from further afield.

The Conference will be held as a hybrid event, with both in-person and virtual attendance options. You'll be welcome to join us on the campus of Worcester State University or from your very own home.

UMASS PESTICIDE RECERTIFICATION TRAINING WORKSHOPS

UMass Extension is offering a series of online workshops in October and November for pesticide license holders to obtain continuing education contact hours. Most workshops offer credits for all categories of licenses. A schedule of available classes, with links to registrations, can be found here: <https://ag.umass.edu/services/pesticide-education/pesticide-recertification-training-workshops>.

There are 3 workshops remaining in this series, on **November 9, 23, and 30**.

The registration fee is \$40/2hr workshop/person. You will pay for these workshops after you successfully complete the workshop. You will receive a separate Zoom confirmation email for each workshop that you register for. Each attendee must register with their own email address and use a separate device (desktop/laptop/smartphone/tablet) during the online workshop.

THANK YOU TO OUR 2021 SPONSORS!



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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