UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

Crop conditions

Tomatoes keep on pouring in and some growers are struggling to pick all of the nice ripe fruit, for which demand is high and markets are always available! One grower needs to turn a tomato tunnel over to make room for winter crops, but laments losing all the green fruit that remain on the plants, wondering if shortening days might have caused the ripening process to slow down–not so it turns out! Steve Reiners, Cornell Cooperative Extension Vegetable Team leader and horticulture professor writes, "Light conditions have very little to do with ripening, but when temperatures exceed 85 to 90 F, the ripening process slows significantly or even stops. At these temperatures, lycopene and carotene, pigments responsible for giving the fruit their typical orange to red appearance cannot be produced. As a result, the fruit can stay in a mature green phase for quite some time." Harvest of other crops is also increasing across the state, including potato, early winter squashes, and most of the onion harvest is now complete. Sweet potatoes are sizing up, and will be harvested next month before frosts arrive since they are sensitive to cold injury. The effects of dry, hot spells this season continue to show up in odd places–like in a field of direct seeded carrots and beets that took two weeks for all the seeds to germinate, causing a very uneven stand. We've seen this all season long, with different growers and fields affected at different times. Some growers have experienced shortages of sweet corn, as many plantings were hard hit by drought and the uneven stands in the early season are producing uneven harvests now. We also have seen lots of calcium deficiency disorders like blossom end rot (*Solanaceae*) and tip burn (*Brassicaceae*), which can be caused by hot and dry but humid weather.

Congressman Jim McGovern toured farms in Western MA this week, pictured here at Atlas Farm in S. Deerfield.

While touring farms this week with Congressman Jim McGovern, we heard from farmers in western Massachusetts about their needs such as: better promotion of winter farmers' markets, more food processing capacity, immigration reform, training and retaining farm managers, reducing debt, and what we like to hear in Extension–more support for farmer prioritized agricultural research. At one point McGovern compared his job to that of the farmers he was visiting with: "The people who do this love it. They work really hard, and at the end of the day they get to point to something they've produced. In Congress, we can work a whole week and I sometimes can't point to anything we've accomplished. I'm kind of envious."

Pest alerts

Vegetable scouting sheets can be found on the UMass Extension Vegetable Program website. When not given here, refer to the New England Vegetable Management Guide for scouting thresholds and treatment options.

Brassica: Cabbage aphids and onion thrips pressure remains high and these pests seem to be driving spray programs

in MA, while caterpillar pests are low in fields that have been making regular insecticide applications to control any of the aforementioned insect pests. In Washington Co. RI and Windsor Co. VT lepidopteran pests (**imported cabbage worm**, and **diamondback moth**) were at threshold in multiple brassica crops. Also found in large numbers in Windsor Co. VT were the pupa of the imported cabbage worm parasitoid *Cotesia Rubecula* (pictured right). Read more about identifying beneficials in this weeks article. Tip burn was observed in cauliflower in a field without irrigation–this disorder is caused by calcium deficiency, which is often a result of low soil moisture and high humidity. Some broccoli crops have suffered from buttoning caused by high temperatures during head formation. **Flea beetle** are present and can limit yield and can spread diseases such as Alternaria leaf spot and black rot. Control if damage to cotyledons or seedlings is stunting growth, or if damage to greens will reduce marketability.

Sweet corn: The second flight of **European corn borer** has been fairly slow so far across the state. **Corn earworm** trap captures have spiked however, and a spray interval of 4 days is called for in all trapping locations. Good control depends on getting good coverage of the silks with directed sprays to the ear zone. If maximum daily temperature is below 85°F for 2-3 days, spray intervals may be extended by one day. Continue treatments until 5-7 days before final harvest, or until silk is completely dry and brown. See article earlier this season on Corn Earworm Management. **Fall armyworm** captures have been low and are not driving corn sprays at this time. Although **Northern corn leaf blight** has not been confirmed by the UMass Diagnostic Lab, many sweet corn fields are beginning to look scorched. One grower reports better tolerance to leaf blights with his varieties: Nirvana, Eden and SV1580. Consult your seed company representative for more information. Plant corn in sites with good air circulation and control weeds to decrease humidity. Scout fields regularly for disease symptoms. Plow under crop debris. A one year rotation out of corn is recommended for fields with a history of NCLB. In no-till systems, a rotation of at least two years is recommended.

Location	FAW	ECB	CEW	Spray Interval for CEW
Western MA				
Hadley	*na*	0	*na*	*na*
South Deerfield	*4*	0	24	*4 days*
Whately	2	2	50	*4 days*
Central & Eastern MA				
Millis	*na*	0	12	*4 days*
Sharon	*na*	2	27	*4 days*
Swansea	*0*	2	12	*4 days*
NH				
Litchfield	7	2	22	*4 days*
Hollis	3	0	12	*4 days*
Mason	1	1	37	*4 days*
Burlington, VT	1	115	*na*	*na*
Kingston, RI	0	0	*na*	*na*

Cucurbits: **Cucurbit downy mildew** was newly confirmed in VT this week and is now found throughout New England. Growers who want to continue harvesting their cucumbers into the fall will want to use materials with short re-entry while still rotating between active ingredients for resistance management. Materials with good efficacy and a 12hr REI or less include (with FRAC codes following): Zampro (45+40), Ranman (21), Presidio (43), and Revus (40). **Powdery mildew** pressure is variable in fields scouted this week. One new variety Butterkin (Butternut and pumpkin) appears to tolerate powdery mildew pressure better than Waltham butternut in the same field.

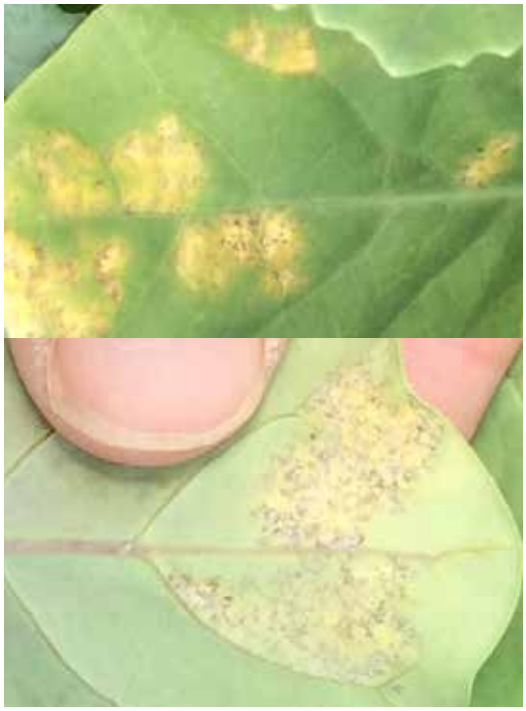
Solanaceous: Potato foliage is going down quickly on many organic farms. At this time of year it can be hard to tell if this is caused by any one disease or another or just natural senescence of plants. If this describes your potato fields try to make sure that you don't have **late blight** present, as it can affect the tubers, but otherwise it is late enough in the season that tubers are probably mature enough and there's no cause for alarm. Another case of **bacterial canker** caused by *Clavibacter michiganensis* subsp. *michiganensis* on pepper was confirmed in MA this week. On pepper this bacterial disease causes light brown, raised lesions on the leaves but does not appear to cause systemic disease (stem lesions and cankers, as in tomato) in peppers, it may serve as a source of inoculum for tomatoes, which are highly susceptible to the disease and often produced in the same greenhouse as peppers or planted in adjacent fields.

Downy mildew of brassicas

With cool nights and cooler daytime weather on the horizon, incidence of brassica downy mildew (*Hyaloperonospora brassicae*) may start to increase. We see the most damage in spring and again in fall when conditions are cool, while in the hotter summer months the pathogen is dormant, though a few outbreaks have been diagnosed already this year, with one case on broccoli transplants in the greenhouse. Occurrence of this disease seems to be increasing, and it differs from other downy mildews in that it produces oospores and can therefore survive in the soil without a host present.

The disease affects nearly all cultivated brassicas as well as brassica weeds. It affects all plant parts including foliage, stems, heads, and roots. Plants can be infected at any stage of growth and may be seed-borne. Disease development is encouraged by cool, moist conditions, whether moisture is from rain, dew, or fog. Infections that occur early in a crop life cycle may be latent or dormant, only showing symptoms later in the field when conditions are again favorable.

Symptoms: On seedlings, bright yellow, irregularly shaped spots appear on leaves. These yellow lesions have black spots or lines throughout, looking almost like a network or like a web. Under cool, moist conditions you may see white cottony growth on the underside of leaves. Yellowed leaves may drop. On older plants these irregular yellow spots will become tan or grayish, papery patches. In cauliflower, dark grey spots may appear on the curd and, when cut open, grey streaking is noticeable on the branches beneath the florets. In broccoli, there may be no spots on the head but grey streaks may form beneath the beads, running all the way back to the main stem. In cabbage, black spots may be evident on the exterior of the head, or internal darkening and purplish spots may occur if systemic infections occur and the pathogen is able to move from the lower leaves into the stem and head. Turnip or radish roots may develop an internal, irregularly shaped brown or black discoloration extending from the crown downward. In advanced stages, the skin becomes roughened and the root may split open, which may be confused with symptoms of Rhizoctonia. Disease can spread in storage and also may allow for entry of secondary rot pathogens.



Symptoms of brassica downy mildew on seedling leaf. Photo by S.B. Scheufele

Disease Cycle: Downy mildew survives from season to season as thick-walled resting spores, called oospores, in crop and weed residues or in the soil. The pathogen may also overwinter in winter-sown host crops. Systemic infections are caused when seeds are infested. The fungus may survive in a latent state within these asymptomatic, systemically infected plants and become active when environmental conditions favor disease development. Secondary spread of the pathogen occurs by asexual spores (sporangia) which are produced when there is abundant moisture on leaves provided by dew, drizzling rain, or heavy fog. Sporulation, germination, and reinfection can occur in as few as four to five days. Sporangia carried on air currents and on wind-blown rain germinate on leaves and produce new infections.

Management: Destroy infested crop residue as soon as possible after harvest. A two-year rotation away from brassicas is an important management step, and be careful to keep brassica weeds out of infested fields during that time as well. Start with disease free seed–ask your seed supplier if the lot has been tested or hot water treat your seeds. Scout seedlings in the greenhouse and try to keep humidity down. In the field, lowering leaf wetness periods and humidity in the plant canopy can be helpful–increase spacing, control weeds, plant in the direction of prevailing winds, and in areas that get full sun. Chemical control of downy mildew is possible, research by Chris Smart and Holly Lange of Cornell University has shown that chlorothalonil, mancozeb, fluopicolide, and copper can be effective, while plant defense-inducing products such as acibenzolar-S-methyl were not effective in downy mildew control. Some crops and cultivars are more susceptible than others, though the relative susceptibilities of crops and varieties has not been studied. Many universities and seed companies report introduction of resistant cultivars are imminent, but none are currently available.

-S.B. Scheufele, M.B. Dicklow, R. Hazzard, UMass Extension

IDENTIFYING BENEFICIAL INSECTS

While scouting in the field for insect pests, also keep an eye out for the insects that are working in your favor. Your pest management decisions should be based in part on the natural controls that are already at work! It is important to be able to identify which insects are doing harm to your crops, and which are doing harm to the pests. Many different insects either prey upon or parasitize other insects that are pests of vegetable crops. Some are generalists and will feed on a variety of insect species, while others are more discriminating–this is generally true of the parasitoids, which lay their eggs within the eggs or body of a specific host. The most effective natural enemies on farms tend to be those that either consume voraciously (e.g., green lacewing larvae, which feed on aphids and many other small insects) or those that are host-specific (e.g., Diaeretiella spp., a wasp which parasitizes aphids exclusively). They should have high reproductive rates and life cycles that coincide with those of their hosts or prey.

The principals of Integrated Pest Management (IPM) include capitalizing on these natural controls to manage vegetable pests, along with using cultural practices and making strategic applications of appropriate chemical controls that interfere with the work of natural enemies as minimally as possible. The goal of IPM is not to eliminate all of the pests from a crop, but to reduce the populations of pests so that they are not causing economic losses, while maintaining enough of the pest population to sustain their natural enemies. It is often the larval stages of predators that do the bulk of the feeding; the adult stages of many beneficial species may only feed on pollen or nectar, so maintaining flowering plants– whether wildflowers at the edges of fields, or sweet alyssum interspersed within the crop– can help to provide both food and shelter for beneficial insects.

Below are a few beneficial insects that are commonly found in farm fields in New England.

Predators

Predatory Midge (*Aphidoletes aphidimyza*) adults are very small (2-3mm), delicate, mosquito-like flies with long legs and long antennae. They feed on honeydew (aphid excrement). The larvae are small (2mm) legless maggots, usually orange or yellow and feed mostly on aphids. Adults fly at night and are rarely seen during the day. They are active from mid to late summer. Their eggs are minute (less than 0.3mm), oval and orange, laid in clusters or singly around aphid colonies. The larvae are very successful predators of aphids and mites. In its lifetime one larva can kill from 10 to 30 aphids. They are widely sold in the U.S. as an important part of biological control programs in greenhouse crops.

Predatory midge. Photo by A. Eaton

Hover fly larva. Photo by M. Spellman

Hover Flies (Diptera: *Syrphidae*) (also known as Syrphid or flower flies) are often found hovering over various flowers for nectar and pollen. Adult flies resemble bees to ward off predators. Their bodies are black or brown with distinct stripes or dots of white or yellow on their abdomen and/or thorax. Hover fly larvae are predators of aphids. They are green, pink or brown in color with long tapered bodies towards the head. The life cycle varies among species and depends on the environmental conditions and availability of food. Single, white eggs are laid onto a leaf near a food source. The eggs hatch within 3 days and the larvae pass through several instars (molts) in a period of 1 to 3 weeks. They'll turn into tan-brown, teardrop-shaped pupa, either on the host plant or the soil. Larvae are voracious predators of soft bodied insects, mainly aphids. They are found throughout North America and are often found on crops and plants attacked by aphids and other pests. Adults intentionally lay their eggs next to colonies of aphids to ensure the success of their offspring. Theadults are also prominent pollinators, and are attracted to flowering plants, especially weedy borders and garden plantings. They prefer small, flat or umbelliferous flowers like wild carrot, herbs, horseradish, and wild mustard. Each larva can consume up to 400 aphids during development. When hover fly larvae are abundant, the aphid population can be reduced by 70 to 100%.

Spined soldier bug. Photo by M. Spellman

Spined Soldier Bug (*Podisus maculiventris*) is the most common species of Podisus, a kind of stink bug, and is found throughout the United States. Adults are pale brown to tan and about 8.5 - 13mm long. They are shield-shaped with noticeable spurs on their "shoulders" immediately behind the head. What separates the soldier bug from other similar looking

insects is the distinctive dark line on the tip of each forewing. Young nymphs are red and black; older nymphs have marks with red, black, yellow-orange and cream bands and patches. The nymphs are round rather than shield-shaped. Females lay hundreds of gray, cream, or gold, barrel-shaped eggs in clusters of 20-30 eggs, on leaves or twigs. Eggs hatch in 5-9 days. Growth from egg to adult lasts about 30-35 days and adults live from 1-4 months. Their prey includes over 100 different species including: European corn borer, diamondback moth, corn earworm, beet armyworm, fall armyworm, cabbage looper, imported cabbageworm, Colorado potato beetle, Mexican bean beetle. They'll target primarily immature insects with their piercing sucking mouth parts. They are recorded to have consumed over 100 late instar fall armyworm larvae during a season.

12-spotted lady beetle. Photo by M. Spellman

12-Spottted Lady Beetles (*Coleomegilla maculata*) are pink to red in color, oval, 5-6 mm long, and have six black spots on each forewing. The oval-shaped pronotum behind their black heads is usually pink or yellowish with two big black markings on it. The larvae of this beetle grow to about 5mm in length and are long, dark, and alligator-like. The eggs are ellipsoid and 1mm long. Twelve-spotted lady beetles overwinter in large groups at field edges beneath leaf litter or stones. They come out in early spring to disperse and find sites to lay eggs and feed on pollen, insect eggs, and small larvae. Females lay their eggs (200-1000 in number) near aphids or other prey from spring to summer. Larvae emerge from the eggs and feed on prey until they attach themselves to leaf surfaces to pupate. The pupal stage lasts 3-12 days, then, adults emerge and live for close to a year. Two to five generations of these lady beetles may occur each year. Twelve-spotted lady beetles are most important as predators of aphids, but they feed on mites, insect eggs, and small larvae as well. Plant pollen makes up a larger part of their diet than it does for other lady beetles, which allows their populations to build up in high pollen crops such as corn. Their searching ability for prey egg masses is excellent and they can contribute significantly to mortality of Colorado potato beetle eggs and small larva in potato.

Mulit-colored Asian ladybeetle. Photo courtesy ipmimages.org

Multicolored Asian Lady Beetles (*Harmonia axyridis*) are convex in shape and somewhat larger than native lady beetles at 7mm long and 5.5mm wide. Their wings are colored yellow, orange, or red and may or may not have black spots on them. They can have up to 19 spots, but their appearance is quite variable throughout the species. A disk-shaped pronotum covers their head. The pronotum is cream or yellow in color and has a distinctive black design on it that is shaped like an 'M'. The larvae of these beetles are long, flat, and black with orange markings and black spines. Eggs are ellipsoid and yellow and found in clusters of twenty or so. Asian lady beetles cycle from egg to adult in about a month and multiple generations of these beetles occur every year. Eggs are laid underneath leaves of various plants. In three or more days they hatch and the larvae thrive on aphids for about two weeks. The beetle then enters the pupal stage, from which adults emerge after several days and live for about a year. Adults overwinter in sheltered locations (including indoors) and mate in the spring. These beetles prey on aphids and scale insects especially. They are not native and are considered both beneficial (for their predation on pest insects) and a nuisance (because they often overwinter in large groups in houses, and because they can be a pest in grapes).

Eggs of green lacewing. Photo by L. Garofolo

Green lacewing (*Chrysopa* and *Chysoperla* spp.) adults are pale green, with a slender soft body, about 1/2" long, and four delicately veined wings. Eggs are laid on filamentous stalks attached to plant tissues. Eggs hatch about 4 days after being laid. Larvae are alligator-like, with a flattened body that tapers at one end, have long, curved mandibles, and are usually pale with darker markings. They measure from 1/8 to 4/5 of an inch. Larvae develop through three instars, and then pupate in silken cocoons attached to plants. The adults of most species are not predaceous, feeding mostly on nectar and pollen. The larvae, however, are voracious predators, and will consume large numbers of a wide range of soft-bodied insects, including other lacewing larvae. Lacewings are found naturally in New England, and are also available commercially, as they are very effective at cleaning up outbreaks of aphids and other pests in greenhouses.

Parasitoids

The beneficial parasitoids that are important in vegetable crops aren't often seen as most of them are tiny wasps. There are thousands of species of parasitic wasps, most of which are highly specialized to use a particular species or family as a host. Several species are naturally occurring in New England, or have been successfully introduced, and others are commercially available for release. These wasps lay their eggs in either the eggs or larvae of their hosts, where the wasp larvae feed on the insides of the host, and pupate in or on the host before emerging as adult wasps. Often what will be visible in crops to indicate parasitoid activity will be either the parasitized host or the pupating parasite.

Caterpillars are commonly parasitized by braconid and icheumonid wasps. The braconid wasp, Cotesia rubecula, was introduced to New England from China in 1988, and is now established in Massachusetts. This wasp parasitizes imported cabbageworm larvae. You may see their small white cocoons on brassica leaves. Diamondback moth eggs are parasitized by the ichneumonid wasp, Diadegma insulare, which occurs naturally in Eastern North America. D. insulare females require sources of nectar to be effective DBM parasitoids, so maintain wildflower stands near brassica fields to encourage their activity. You may be more familiar with the pupae of another parasitic wasp, Cotesia congregatus, which lays its eggs under the skin of the tomato and tobacco hornworms. The larvae feed within, then emerge to pupate on the surface, eventually killing the host. If you see a hornworm in your tomato crop with many white cocoons on its back, don't kill it – either leave it be, or move it to another area where it can't continue feeding, to allow the wasps to develop.

Tomato hornworm covered in pupal cases of wasp parasitoids. Photo by S.B. Scheufele

Aphids also have many parasitic wasps that rely on the aphids' bodies to produce and feed their young. If you see puffy, tan or golden aphids among an aphid colony, these are aphids with one of these wasps pupating within, and are called aphid "mummies". Sometimes you will see a small hole in the mummy, indicating that the adult wasp has emerged. The braconid wasp Diaeretiella rapae, parasitizes many species of aphid, but is particularly fond of cabbage aphids. Keep an eye out for these mummies when scouting for aphid colonies to get an idea of the level of the biological control you're getting.

-Adapted by Lisa McKeag from original article by Kristina Fahey and Ayana LaSalle, Stockbridge School of Agriculture Students.

FALL SOIL TESTING

Although soil samples can be taken any time, many prefer to take samples in the fall because this allows time to apply any needed lime to adjust pH, plant a cover crop to recover any leftover nutrients, make a nutrient management plan, and order materials well in advance of spring planting. 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 and mixed together. To obtain sub-samples, use a spade to take thin slices of soil representing the top 6" to 8" of soil. Make sure to remove any thatch or other organic debris such as manure from the surface before taking your sample as this will inaccurately determine your soil organic matter content. A soil probe is faster and more convenient to use than a spade. Put the slices or cores into a clean container and thoroughly mix. Take about one cup of the mixture, dry it at room temperature spread out on paper, put it in your own zip lock bag, and tightly seal it. Label each sample on the outside of the bag or box. On the submission form to the lab for each sample, indicate the crop to be grown, recent field history and any concerns.

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: "There was a tractor mishap in this field years ago and a ton of lime was dumped right here." In such cases, the field should be subdivided and composite samples tested for each section or avoid problem areas entirely.

Soils should be tested for organic matter content every two or three years. Be sure to request this as it is not part of the standard test. A standard soil test costs $15; with organic matter it costs $21.

Submitting soil samples:

Depending on your goals, different tests are appropriate. In addition to standard soil tests, other services are available including: Pre-Sidedress Soil Nitrate Test (PSNT), manure analysis (from the University of Maine,) compost analysis, greenhouse media, soil texture, and plant tissue analysis. (Click on each link to access the submission form).

A fall nitrate test or "report card nitrate test" as some university labs call it, indicates how closely crop nitrogen (N) uptake has been matched with nitrogen supply for the season. High (> 20 ppm) or excessive soil nitrate content in the fall indicates that too much N fertilizer was applied in the prior season, and a fall cover crop would be beneficial to conserve this remaining N for the following season. Use the Pre-Sidedress Nitrogen Test form to submit a Nitrate test soil sample, or be sure to check to box for N on the standard soil test submission form; it is only an additional $6.

A standard soil test that includes other macro- and micronutrients can help you make the best choice to fit a particular crop to a given soil nutrient profile for the following season. When submitting your soil sample for testing, include the crop code on the form for the crop to be grown in that field the following year. Haven't prepared your crop rotation plans yet? No worries. You may ask for recommendations of up to 3 different crops without extra charge. Use this form for Vegetable and Fruit Crop Soil Submissions.

For specific information on interpreting your UMass Soil Test results, see this factsheet that accompanies each soil test report.

Soil pH: Most New England soils are naturally acidic (4.5-5.5) and need to be limed periodically to keep the pH in the range of 6.0 to 7.0 desired by most vegetable crops and beneficial microbes. The lab report will recommend the amount of lime to apply based on active and exchangeable acidity as well as the crop(s) to be grown. Active acidity is a measure of the H+ ions in solution while exchangeable acidity is a measure of H+ ions adsorbed on soil humus and clay colloids. Soils with a higher cation exchange capacity (CEC) have a greater potential for higher exchangeable acidity. Therefore, more lime will be needed to raise the pH in a high CEC organic matter soil than in a low CEC sandy soil with the same amount of active acidity. 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 used effectively.

Compost is often applied as a method for increasing 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. While only about 10% of total N analysis in compost is available to the crop each year, 80-100% of P analysis in compost has been shown to be available, increasing the potential for losses to the environment if not applied to actively growing crops. Phosphorous content also varies in compost from 0.1-3%, so analysis is important for determining rates of application. Sheet composting is not a recommended practice on bare fields in the fall unless a covercrop is planted. A compost analysis ($60) should be completed to measure nutrient availability and to determine if the product is finished before applying to the field. If you are buying in compost ask your supplier for a copy of the compost analysis. Unfinished compost applied to the field may harbor pathogens or harm crops as it continues to decompose. Ammonium content <100mg/kg and C:N ratio of 20:1 indicates a finished compost. Higher amounts of ammonia indicate active decomposition, or, unfinished compost, and the C:N ratio is reduced as microbes break down carbon content in the pile and convert it to CO_2. Matured compost applications are usually made in the Spring, however, testing may happen in the fall in order to estimate plant available nutrients for next year's crop and help determine future compost application rates.

Manure is an excellent source of nutrients, however, as manure ages and decays, considerable nutrient loss occurs from leaching, surface runoff, or volatilization of ammonia into the atmosphere. Manure may also contain pathogens such as E. coli and salmonella. If manure is used, vegetables should not be harvested after 120 days of application. This is a requirement for organic production and a good practice for everyone. In most cases, 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. Manure applications should be made 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 manure can be effectively surface applied to a growing cover crop to reduce nutrient losses, but not to bare ground. In order to make accurate nutrient applications to best fit your crop needs, a manure analysis should be conducted. The University of Maine has a manure testing 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, preferably before September 15th, are an excellent way to capture and store nutrients for

your crops in the following spring. While your soil test results will not recommend cover crop selection, here are some general guidelines for fall planted covercrops and their spring contributions of plant available nitrogen (PAN) per acre:

Legume cover crops provide up to 100 lb PAN/a. 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. To minimize PAN immobilization from cereals, kill the cover crop during the early stem elongation (jointing) growth stage.

Legume/cereal cover crop mixtures provide a wide range of PAN contributions, depending on legume content. When cover crop dry matter is 75 percent from cereals + 25 percent from legumes, PAN is usually near zero.

Micronutrient application recommendations cannot be determined accurately by soil labs in New England because deficiencies in crops have not been widely measured in our soils. However, the soil test results do report the ranges found in all the soils that come through the lab so that you may compare where your soil falls in regards to other soils in New England. For recommendations on specific micronutrients needed for crop growth, such as Boron, see the New England Vegetable Management Guide section on micronutrients. Preferred timing of micronutrient applications in the Fall vs. Spring has not been determined.

Other nutrient applications should be avoided until spring when a growing crop is best able to use the applied nutrients in water soluble form 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:
Frank Mangan
Phone: (413) 545-1178
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Katie Campbell-Nelson
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Cover crops:
Masoud Hashemi
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-Katie Campbell-Nelson, UMass Vegetable Extension, 2015

Events

Twilight Meeting: Nutrient Management, Soil & Crop Fertility

When: Friday, October 2, 2015 from 4pm to 6pm
Where: Langwater Farm, 209 Washington St, North Easton, MA

This year's Twilight Meeting will focus on nutrient management from the bottom up and will feature:

- Explanation of new statewide nutrient management regulations which will go into effect on December 5, 2015 by MDAR
- Cover crop-based fertility and on-farm composting at Langwater Farm
- Compost analysis and interpretation by Katie Campbell-Nelson
- Weed management by Rich Bonanno

Langwater Farm is a 50 acre certified organic farm in Southeastrern MA run by Kevin O'Dwyer. Before starting Langwater in 2010, Kevin was head grower at Ward's Berry Farm in Sharon, where he started farming at age 14.

THANK YOU TO OUR SPONSORS

Vegetable Notes. Katie Campbell-Nelson, Lisa McKeag, Susan Scheufele, co-editors.

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