UMass Extension
# Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

Volume 29, Number 4 April 13, 2017

## In this issue:



*It's on! Transplanting pak choy into a Franklin Co. field*

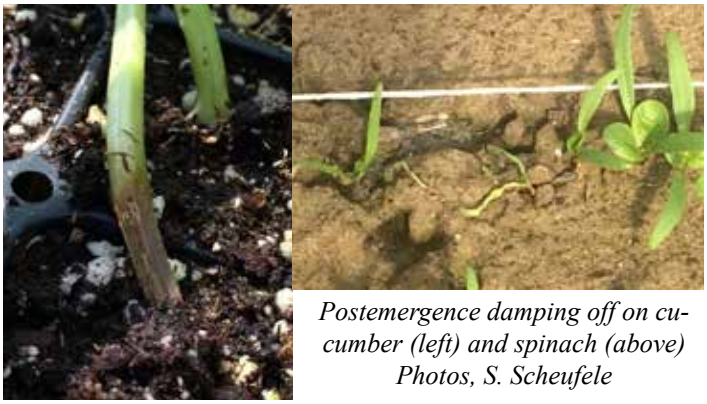
## Crop conditions

Over the past 2 months we've heard from growers who were able to sneak into fields to plow during the February warm spell. Some of these early birds have since planted beets and carrots, and a few brave souls even got corn in under plastic. With the summerlike weather this week reaching into the 80's, many were plowing, chiseling, disking, and subsoiling. Brassicas were transplanted outdoors with hoops – ready at a moment's notice to be covered for frost protection. As winter high tunnel greens production wraps up and summer crops go in, we've been receiving many calls to visit tunnels to diagnose a plethora of problems. In the past month we've found the culprits to be: nitrogen deficiency in arugula, lettuce, and radish; winter cutworm in spinach and pakchoy; voles beheading kale (Berkshire Co.); cladosporium and downy mildew in spinach; foxglove aphid on tomato; and Pythium root rot in cold sensitive cucurbit seedlings (Hampshire Co.). The non-native chilli thrips (*Scirtothrips dorsalis,* see photo below) was confirmed by Tawny Simisky at the UMass Plant Diagnostic Lab on foliage of *Hydrangea* spp. from two residential landscapes in Barnstable Co. last month. It is reportedly a pest of over 100 host plants including, but not limited to, pepper, strawberry, blueberry, cotton, rose, peanut, Japanese privet, *Rhododendron* spp., *Viburnum* spp., eggplant, grapes, melon, tobacco, and tomato. For more information, please visit this Chilli Thrips Fact Sheet. Keep your eyes out this season, but the significance of chilli thrips in Massachusetts is not known at this time. Replacing winter greens, two- and three-week old peppers, cucumbers, and tomatoes (some grafted) are going out into heated high tunnels around the state. Greenhouses are starting to spill over with transplants for the field: cabbage, beets, leeks, even some early peppers. Lastly, you may be excited to hear, the Vegetable Program has joined the 21st century! Katie Campbell-Nelson participated in her first webinar with Abha Gupta and Heather Darby from UVM talking about their research on "High Glucosinolate Mustard as an Organic Biofumigant in Vegetable Crops". Click here to watch the archived webinar.

*Chilli thrips adult*

## Considerations for reducing damping off diseases

As the name would suggest, damping off is a disease that often occurs where soil moisture is too high, causing seeds or seedling to rot. That said, *Rhizoctonia solani* can cause damping off symptoms under dry soil conditions. Damping off affects nearly all plants and can be caused by a number of soil-dwelling microbes that are ubiquitous in soil including *Pythium* spp. and *Phytophthora* spp. as well as *Rhizoctonia solani*. These organisms attack seeds and seedlings and cause them to grow poorly, wilt, or die. Sometimes the seedling is killed before it even emerges from below the soil, known as pre-emergence damping off. In cases of postemergence damping off, the seedling survives for a while but may be slow to emerge, stunted, and unthrifty before it finally wilts and dies. Roots of diseased plants usually have brown tissue and the



*Postemergence damping off on cucumber (left) and spinach (above) Photos, S. Scheufele*

outer layer may be partially rotten. Other potential causes of seedling collapse include excessive fertilization, high levels of soluble salts, excessive heat or cold, excessive or insufficient soil moisture, bleach residue on trays, and severe infestation of fungal gnat larvae or other insects, but roots of these plants will appear healthy and white. Vigorous plants can usually outgrow damping off, but if the seed is old, the soil is too cold, or moisture is too high then the plants will succumb to the disease. Plants with wounded roots are also more susceptible, so damping off may be more prevalent if root-feeding insects such as fungus gnat larvae or wireworms are present. Damping off pathogens survive in soil in the field or adhering to flats, trays, and pots in the greenhouse, so sanitation of tools and equipment is extremely important.

See Cleaning and Disinfecting the Greenhouse for information on how to clean and sanitize flats, pots, and greenhouse surfaces.

*A tray of alliums with algae and fungus Photo, S. Scheufele*

**In greenhouse transplant production**, damping off is directly related to water. Take care not to overwater, paying special attention to smaller, slower-growing plants like onions, leeks, and peppers. For these crops that require less water, a light media and/or a misting wand may be beneficial. A lighter media with a lower percentage of peat or compost will also help reduce growth of algae on the soil surface and will support fewer fungus gnats—as they are attracted to moist soil where fungi thrive—whose larvae can cause wounding of roots and lead to damping off. One could also use the same soilless mix but add in some extra perlite or coarse sand to lighten it up. Also, choose the right size cell for the crop—if the crop is slow growing, a very small cell may be best so that there is not too much extra soil in the cell retaining excess moisture. When watering, anticipate that trays may dry out slowly when the weather is overcast and reduce watering. Water in the morning and if a second watering is needed, make sure it is made early enough in the day that the soil has a chance to dry out before morning. Avoid overcrowding plants and use fans to improve airflow and dry out soil more quickly.

*Bottom rot on lettuce Photo, S. Scheufele*

**In the Field**

Damping off can also occur in the field where it may cause reduced stand or stunted growth in direct-seeded crops. This is especially true where soils are still cool and plant germination and growth is slow. Though it is tempting to try to push things and plant early, it is best to wait until the soil is adequately warm for the crop you are planting. Planting seeds too densely can also result in increased damping off and patchy or poor stands.

Once plants are established in the field they are not usually susceptible to damping off, though one of the damping off pathogens, *Rhizoctonia solani*, can cause disease throughout a plants life. These diseases include wirestem in brassicas—where the hypocotyl becomes skinny and turns brown, sometimes causing the plant to die—and bottom rot in cabbage and head lettuce—where the lower leaves that are in contact with the soil turn brown and rot away.

**Management**

- Sanitize greenhouse surfaces, trays, and tools
- Wait until the appropriate soil temperature has been reached, don't plant into cool soil
- Ovoid overwatering
- Use vigorous seed

- Do not seed or plant too densely
- Allow for airflow around plants to keep foliage and soil dry

**Chemical Control**

- Use seeds treated with a fungicide, whether synthetic or biological
- Mix biopesticides, e.g. Rootshield Plus or Mycostop Mix, into soilless media before seeding
- Several fungicides both synthetic and biological are labeled for use in the greenhouse. Fungicides are not considered effective in a field setting, where the focus should be on planting vigorous seed into warm soil at the proper spacing. Consult the New England Vegetable Management Guide Vegetable Transplants section for materials and more information.

*--Written by Susan B. Scheufele, UMass Extension*

## USING SOIL MOISTURE SENSORS TO MANAGE IRRIGATION

After the worst drought in over 50 years, many farmers in Massachusetts have invested in improving their irrigation systems. One of the simplest and cheapest methods to improve irrigation is to begin monitoring soil moisture with a sensor or tensiometer. Soil moisture sensors will help you determine when to begin irrigating, and almost as importantly, when to turn off irrigation in order to conserve moisture.

Irrigation needs of different vegetables vary greatly. Vegetable crop water requirements range from about 6" of water per season for radishes to 24" for tomatoes and watermelons.

**Brassicas and Leafy Greens:** Cabbage, lettuce, and spinach are generally planted at or near field capacity. Being shallow rooted, these crops benefit from frequent irrigation throughout the season. As leaf expansion relates closely to water availability, these crops--especially cabbage and lettuce--are particularly sensitive to drought stress during the period of head formation through harvest. Overwatering or irregular watering can result in burst heads. Broccoli and cauliflower are sensitive to drought stress at all stages of growth, responding to drought with reduced growth and premature heading.

**Root, tuber, and bulb vegetables:** Sweet potato, potato, carrot, and onion crop yields depend on the production and translocation of carbohydrates from the leaf to the root or bulb. The most sensitive stage of growth generally occurs as these storage organs enlarge. Carrots require an even and abundant supply of water throughout the season. Stress causes small, woody, and poorly flavored roots. Uneven irrigation can lead to misshapen or split roots in carrots, secondary growth in potatoes, and early bulbing in onions.

**Fruiting vegetables:** Cucumbers, melons, pumpkins and squashes, beans, peas, peppers, sweet corn, and tomatoes are most sensitive to drought stress at flowering and as fruits and seeds develop. Fruit set on these crops can be seriously reduced if water becomes limited. Maintaining moisture at field capacity during the period of fruit enlargement can reduce the incidence of fruit cracking and blossom-end rot in tomatoes. Irrigation is often reduced to a range between wilting point and field capacity as fruit and seed crops mature.

### Installing and Using Moisture Sensors

A soil moisture sensor measures soil tension that a plant root exerts to suck water from the soil. This tension changes based on the rate of evapotranspiration which is equal to the quantity of water lost from the plant (transpiration) plus that lost from the soil by surface evaporation. Research has shown that maintaining soil moisture levels in a narrow range maximizes crop response. More frequent application of smaller amounts of water is better than delaying irrigation to when crops reach a wilting point. Irrigate when 25-50% of the plant available water has been used and bring soil to field capacity (10-30 centibars depending on soil texture). Irrigate at a rate appropri-

| SOIL TEXTURE | 25-50% PAW (centibars) | INCH PER HOUR RATE |
|---|---|---|
| Coarse sand | 12-20 | 0.75 to 1.00 |
| Sandy Loam | 20-40 | 0.50 to 0.75 |
| Fine sandy loam | 25-50 | 0.35 to 0.50 |
| Silt loam | 40-85 | 0.25 to 0.40 |
| Clay loam | 45-90 | 0.10 to 0.30 |

**Table 1. Plant available water, Soil Infiltration Rates and Different Soil Textures**

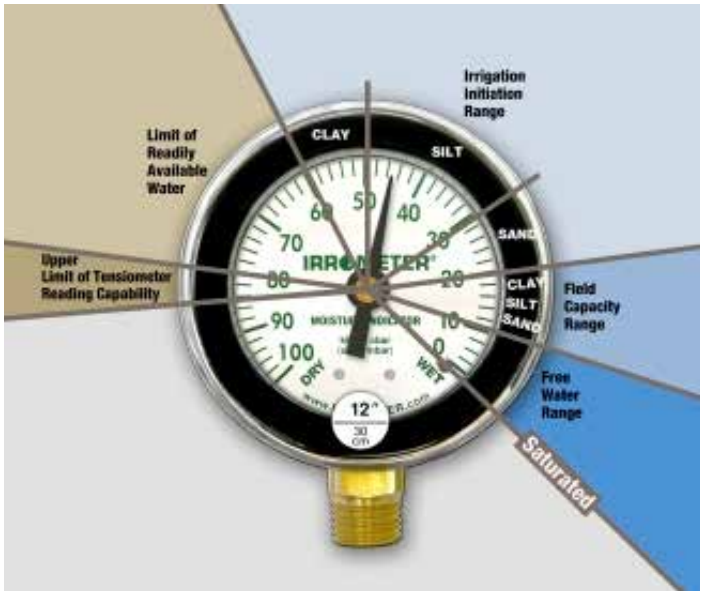



*Figure 1. Irrometer gauge interpretation*

ate for your soil type (Table 1, previous page).

The cheapest sensors are the Irrometer tensiometers which work well, but their pressure gauges can break within the season and these must be manually checked. The Watermark, Hansen and Spectrum sensors are more expensive, and a moisture meter must be purchased in order to read the output, however, these sensors may be wired to send you text alerts related to irrigation, map out rates of evapotranspiration by taking regular measurements, or may even be wired directly into irrigation systems to turn on and shut off automatically! Use Figure 1 to determine irrigation timing when using an Irrometer, and consult Table 1 to determine irrigation timing when using other sensors.

To maintain soil moisture at field capacity for most vegetable crops, two soil moisture sensors may be installed--one at 6" and the other at the rooting depth of the crop (12" for pepper, 18-24" for tomato, cucumber and eggplant)--placed 2ft apart or more in a row. The upper sensor indicates when soil moisture near the surface is being depleted (begin irrigating) and the lower sensor shows when the moisture has moved to the bottom of the root zone (stop irrigating). In beds with drip tape, place the tensiometer about 6" from the tape toward the end of the row to make sure water is reaching the end. Depending on the soil texture, irrigate when your tensiometer or moisture sensor is between 25-50% plant available water and bring the soil moisture level up to field capacity for your soil type. Soils high in organic matter (>5%) will have a higher water holding capacity, so, monitor the rate of depletion and irrigate accordingly (perhaps more closely to a clay loam). A soil factor that influences irrigation practices is the infiltration rate. Water should not be applied at a rate greater than the rate at which the soil can absorb it. Table 1 lists typical infiltration rates of several soils.

*Figure 2. A soil probe used for taking soil samples is conveniently the same diameter as the Irrometers and Watermark sensors, and makes installation a breeze.*

**Soil Moisture sensors:** Hansen, Spectrum Technologies, Irrometer

**Resources:**

Shock, C.C. et al. Irrigation Monitoring Using Soil Water Tension. EM 8900, Rev. March 2013. Oregon State University. https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8900.pdf

NRCS, Chapter 9: Irrigation Water Management. 210-vi-NEH 652, IG Amend. NJ1, 06/2005. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_017781.pdf

Irrigating Vegetable Crops. UMass, Jan. 2013. https://ag.umass.edu/vegetable/fact-sheets/irrigating-vegetable-crops

**Glossary:**

**Field Capacity (FC):** soil water content after gravity has removed any freely draining, excess water. It occurs soon after an irrigation or rainfall event fills the soil to saturation (0 centibars). Field capacity is about 10 centibars soil water tension (0.1 atmosphere or bar), for sandy soils, and 30 centibars for medium to fine textured soils.

**Plant available water (PAW)** is the amount of water in the soil between **field capacity** and **wilting point**. It is expressed as inches of available water per foot of soil.

**Soil water potential** or **soil moisture tension** is a measurement of how tightly water clings to the soil and is expressed in units of pressure called bars or centibars (one bar is equal in strength to the pressure of one atmosphere). Generally the drier the soil, the greater the soil water potential and the harder a plant must work to draw water from the soil.

**Wilting Point (WP):** Soil water content at which most plants cannot recover from wilting. Generally wilting point is assumed to be 150 centibars of tension; beyond the accurate measuring capacity of most moisture sensors.

*--Compiled by Katie Campbell-Nelson, UMass Extension*

## TOMATOES AND THE VIRUSES THAT LOVE THEM

Tomatoes are susceptible to several viruses, many of which can devastate a crop. Viral outbreaks are often difficult to predict because they are sporadic in nature: an epidemic in one year may be followed by several years in which the virus is not reported at all.

There are no anti-viral products for control of viruses in vegetable crops. Viral diseases are best prevented by using clean seed and controlling weeds that may harbor viruses. It is also important to understand the specific ways in which a virus is transmitted. Viruses travel from plant to plant in one of three ways:

- **Mechanical:** Some viruses such as tobacco mosaic virus (TMV) are spread mechanically by machinery, tools, or the hands of farm workers. They may also be carried on the bodies of insects or animals. As people, animals, and insects move among plants, leaf hairs are frequently broken. Sap from an infected plant is picked up on hands and bodies and can be carried to uninfected plants, where the virus can enter through small wounds such as broken leaf hairs.
- **Propagation:** Other viruses, such as cucumber mosaic virus (CMV) can be transmitted through infected seed. Viruses may also be spread by grafting or vegetative propagation of infected mother plants.
- **Vectors:** Most viruses are transmitted by vectors, organisms that transfer the virus to the host plant in the process of feeding on it. These viruses have specialized relationships with their vectors and are harbored for some time in the vectors' bodies. Insects are the most common type of vector. Plant viruses may be transmitted by insect vectors in a persistent or non-persistent manner.
  - In persistent transmission, the virus becomes systemic inside of the insect. The insect therefore becomes a lifelong carrier of the virus.
  - In non-persistent transmission, the virus does not become systemic within the insect, and the insect is only capable of transmitting the virus for a short time (a few hours).

*Leaf deformity caused by tobacco mosaic virus*


*Cucumber mosaic virus symptoms on tomato*

In the past, impatiens necrotic spot virus (INSV) was one of the most common viral pathogens on tomato, but it is seldom seen today. Listed below are some other noteworthy tomato viruses.

**Tobacco Mosaic Virus (TMV)** is a tobamovirus with a wide host range. Its primary mode of transmission is mechanical, but in tomatoes it is occasionally seed borne. It is very stable and can survive for decades in dried plant material. Symptoms include light green or yellow mosaic, leaf distortion, and reduction of fruit number and/or size. Brown streaks may be observed on leaves and petioles when TMV and another virus are present in the same plant.

**Cucumber Mosaic Virus (CMV)** is a cucumovirus non-persistently transmitted by aphids. It has a wide host range and is capable of overwintering in several common weed species. It is not believed to be seed borne in tomato. The most characteristic symptom of CMV on tomato is a severe narrowing of the leaflets, commonly called "shoestring." There may also be yellow mottling on the leaves.


*Tomato spotted wilt virus symptoms on tomato*

**Tomato spotted wilt virus (TSWV)** is perhaps the most common tomato virus in the northeastern U.S. today. It has one of the largest host ranges of any plant virus, including approximately 800 plant species. Symptoms include dark necrotic tissue, particularly near the petiole end of the leaf and extending along leaf veins. Leaf deformation, tip dieback, yellowing, mottling, ringspots, stunting, and wilting may also occur. Mottle and ringspot may also be observed on fruit. TSWV is a tospovirus spread persistently by several species of thrips. Thrips can only acquire the virus during the larval stage, but the virus remains in the insect throughout its life. The insect is capable of transmitting the virus within 3-10 days of acquisition. TSWV is not known to be seed borne.

**Tomato chlorotic spot virus (TCSV)** is also a tospovirus transmitted persistently by thrips. First detected in South America, TCSV was diagnosed in Florida in 2012 and in Ohio in 2013. It has since been found in a number of Caribbean nations. Symptoms are similar to its relative TSWV: dark necrotic tissue, sometimes yellow spots, ringspots, mottling, deformed leaves, stunting, and wilting. Ringspots may appear on fruit. Pepper, lettuce and long bean are also hosts, along with some weeds (black nightshade, jimsonweed) and a number of ornamental plants. Several other plants have been infected experimentally, indicating that the host range of this virus may be broad. Serological tests for TSWV also come up positive for TCSV, leading some to believe this virus may be more widespread than originally thought.

**Tomato chlorosis virus (ToCV)** was diagnosed in Maryland in March of this year. It is distributed worldwide but is not believed to be seed-borne. ToCV is closely related to **tomato infectious chlorosis virus (TICV)**. Both are criniviruses transmitted in a non-persistent manner by whiteflies. Symptoms of these two viruses are identical and include reduced vigor, interveinal chlorosis, mottling, red or brown flecks, bronzing, brittleness, and rolling and/or thickening of leaves, especially older leaves. Symptoms can resemble those caused by nutrient deficiency or other abiotic factors. It can be 3-4 weeks before an infected plant develops symptoms.

**Pepino Mosaic Virus (PepMV)** was first identified in Peru in 1974. It was reported for the first time on tomatoes in the Netherlands in 1999 and has since been detected in several countries in Europe and the Americas, as well as China and South Africa. It is a potexvirus and is spread mechanically. PepMV is more common in greenhouses than in the field. Symptoms include yellow mosaic, leaf distortion, necrotic lesions on stems and petioles, and mottling of fruit. It may be transmitted by seed.

**Begomoviruses** are a genus of viruses in the family Geminiviridae. These viruses are transmitted by whiteflies. They have grown in importance in recent decades due to the emergence of new viruses and new insecticide-resistant biotypes of whitefly. **Tomato yellow leaf curl virus (TYLCV)** is a member of this group. TYLCV has been reported in California and in several southern states in the past 15 years. It may be transmitted by seed.

**Disease Diagnosis**

Viruses are far too small to be seen with a light microscope, although some will form clusters that may be observed by staining plant tissue. Simple laboratory testing methods do not exist for many viruses. There are serological tests for several of the more common viruses, but it is possible for a single plant to be infected with more than one virus. Sometimes a diagnosis can be reached only on the basis of symptoms and by excluding other potential causes of disease. The presence of a viral vector can be an important clue.

**Viral Disease Management**

In addition to clean seed and weed control, do not grow tomato transplants in the same greenhouse with ornamentals as they may harbor viruses. Consider growing resistant varieties when they are available. For a full list of virus-resistant tomato varieties, see http://vegetablemdonline.ppath.cornell.edu and choose 'Resistant Varieties' from the menu.

Since most viruses are transmitted by insect vectors, controlling these vectors is crucial. Traditionally, insecticides are recommended for control of persistently transmitted viruses, but not for those transmitted non-persistently. This is because insects that transmit viruses non-persistently may cease to pass the virus on to plants before they are killed by the insecticide. This recommendation came about in part to discourage insecticide use when insect populations are below threshold levels, and in part because research has demonstrated that insecticides do not mitigate the spread of non-persistently transmitted viruses. If you are growing in a greenhouse or high tunnel, it may be wise to employ biological control organisms to prevent insect pest populations from getting out of hand.

*--by Angela Madeiras, UMass Plant Disease Diagnostic Lab*

# PESTICIDE REGISTRATION UPDATES

### EPA Denies Petition to Revoke Chlorpyrifos Registration

Farmers relying on chlorpyrifos (Lorsban) for controlling pests such as cabbage root maggot may continue using the pesticide for now. In March of this year, the EPA under its new Administrator Scott Pruitt, denied a petition that asked for revocation of all pesticide tolerances for chlorpyrifos and cancellation of all registrations. The petition stated concerns about the combined effects of chlorpyrifos residues on food with low-level environmental exposures, particularly among populations living near agricultural areas where they may be affected by drift and/or exposure through drinking water. The EPA released a revised human health risk assessment and refined drinking water assessment in November 2016. The risk assessment did show that, based on labeled uses, the expected residues of chlorpyrifos on food crops exceed the safety standard under the Federal Food, Drug, and Cosmetic Act (FFDCA), and the majority of estimated drinking water exposure from currently registered uses, including water exposure from non-food uses, continues to exceed safe levels, even taking into account more refined drinking water exposure. The assessment also shows risks to workers who mix, load and apply chlorpyrifos pesticide products. The EPA will continue to review the science as part of their registration review and release a final assessment by the statutory deadline of October 1, 2022.

### EPA Issues Sulfoxaflor Registration for Some Uses

We told you last March that the EPA had issued a final cancellation order in November 2015 for all materials containing the active ingredient, sulfoxaflor (Closer SC, Transform WG) because of concerns about its effect on bees. The material has been re-registered based on a re-evaluation of the data. Sulfoxaflor will now have fewer uses and additional requirements that will protect bees. Use is restricted to post-bloom only for crops attractive to bees; use on indeterminately blooming crops has been prohibited. Sulfoxaflor may be applied to leafy vegetables including brassicas, and bulb, root and tuber vegetables if harvested before bloom. Use on fruiting vegetables and potatoes is limited to post-bloom. Restrictions on application methods have also been made.

### Cancellation of Flubendiamide Finalized

We also reported last March that the EPA had issued a notice of intent to cancel the registrations of products containing flubendiamide (Belt SC, Vetica), but the final decision was pending a hearing requested by Bayer, the manufacturer, to defend their products' registrations. Bayer decided not to pursue the appeal, and the EPA's original cancellation order stands. Existing stocks may be sold and used legally.

### Trident, an OMRI-approved Bt for Colorado Potato Beetle Registered

Finally, we're excited to report that Trident, a *Bacillus thuringiensis* var. *tenebrionis* bioinsecticide, has been returned to the market. However, the product is not currently registered in any of the New England states. A representative from Certis, the manufacturer, said that they are planning to register the product in all of the US states, and are in the process of submitting the applications. They said that New England registrations can likely be anticipated in the next few months. We'll update you when we know more, but I recommend that growers request that their dealers carry the product when it becomes available. Colorado potato beetle can quickly develop resistance to insecticides, and rotational tools are essential for this pest's management. Organic growers are particularly at risk because of the scarcity of effective materials available for their use. Many use spinosad (Entrust) exclusively for CPB control, so having another option targeted for control of this pest will be a great addition to their tool boxes.

*--by Lisa McKeag, UMass Vegetable Program*

# GRANTS AVAILABLE

### NRCS High Tunnel Grants for Farmers in Urban Massachusetts Counties

The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) now has financial assistance available through the Agricultural Management Assistance (AMA) program to help Massachusetts farmers install high tunnel systems. The assistance is available to growers in counties where the urban population density is 50 percent or greater. All Massachusetts counties except Franklin County meet that criteria.

Farmers may sign up for the program beginning immediately. Applications will be considered through a monthly

batch ranking process on May 19, June 16, and continuing each third Friday until available financial assistance is expended. Eligible farmers may receive an incentive payment based on the statewide average cost for installing planned conservation practices. Socially disadvantaged, limited resource and beginning farmers are eligible for a higher payment rate.

A conservation plan must be completed before an application can be considered for funding, so farmers are encouraged to call or stop by their local NRCS field office as soon as possible. USDA Service Center locations are listed on-line at http://offices.usda.gov or in the phone book under Federal Government, U.S. Department of Agriculture. General program information is available on the Massachusetts NRCS website at www.ma.nrcs.usda.gov.

NRCS is a federal agency that works hand-in-hand with the people of Massachusetts to improve and protect soil, water and other natural resources. The agency has offices in USDA Service Centers in Greenfield, Hadley, Holden, Pittsfield, Westford, West Wareham and West Yarmouth, which work with local conservation districts and other partners to serve farmers and landowners in their area.

Click Here for more information on NRCS Massachusetts approved high tunnel products and application materials.

## MDAR Ag-Energy Grant (Ag-Energy) Programs

The purpose of the MDAR's Ag-Energy Grant Programs is to assist agricultural operations in an effort to improve energy efficiency and to facilitate adoption of alternative clean energy technologies in order that they can become more sustainable and the Commonwealth can maximize the environmental and economic benefits from these technologies. This year's AgEnergy Grant Request for Responses (RFR) contains applications for two separate energy programs: our Ag-Energy Traditional Grant, now in its 10th year, encompassing a wide variety of energy efficiency and renewable energy projects: and Ag-Energy Special Projects, now in its 2nd year, for six specific project categories for agricultural energy projects that would typically require higher capital cost but potentially yield greater savings and/or positive agricultural impacts.

Reimbursement grants of up to $30,000 will be awarded on a competitive basis for the Ag-Energy Traditional Grant Program, while reimbursement grants up to varying amounts by category will be awarded on a competitive basis for the six specific categories under Ag-Energy Special Projects. **The deadline for both program applications is Wednesday, June 7, 2017. All projects must have construction completed by June 30, 2018.**

By implementing these projects under our programs, agricultural operation can help demonstrate novel ideas while contributing to the goals of: the MA Food Systems Plan; MA Energy Efficiency and Renewable Energy Implementation; and the MA Global Warming Solutions Act; and to advance technologies that can be replicated at other agricultural operations in Massachusetts.

Ag-Energy Grant applications are now available at the state website COMMBUYS and www.mass.gov/eea/agencies/agr/about/divisions/ag-energy.html.

## MDAR Agricultural Environmental Enhancement Program (AEEP)

The purpose of AEEP is to support agricultural operations that are looking to install conservation practices that prevent direct impacts on water quality, ensure efficient use of water, as well as address impacts on air quality. By providing reimbursement directly to agricultural operations that implement eligible projects that prevent, reduce or eliminate environmental impacts, the program achieves its purpose and goals of minimizing environmental impacts from these operations for the benefit of the Commonwealth.

AEEP is a competitive, re-imbursement grant program that funds materials and labor up to $20,000 or 80% of project costs. All projects must be completed by June 30, 2018. **The deadline for applications is Wednesday, June 7, 2017.**

AEEP grant applications are available at www.mass.gov/eea/agencies/agr/about/divisions/aeep.html.

## MDAR Agricultural Food Safety Improvement Program (AFSIP)

The purpose of AFSIP is to support produce operations that are looking to upgrade food safety practices within their operation. By enhancing food safety measures these operations are able to maintain or increase their market access while working towards minimizing the risk of microbial contamination and food-borne illnesses. This re-imbursement grant program is currently only open to produce operations.

AFSIP is a competitive, re-imbursement grant program that funds projects up to $25,000 or 75% of total project costs.

All projects must be completed by June 30th, 2018. **The deadline for applications is Wednesday, June 7, 2017.**

AFSIP grant applications are available at www.mass.gov/eea/agencies/agr/about/divisions/afsip.html.

# Events

## Produce Safety Alliance Grower Training—Hadley, MA

**When:** Tuesday, April 25th from 8:30 am to 5:00 pm

**Where:** Hadley Farms Meeting House, 41 Russell St., Hampton Village Barn Shops on Route 9, Hadley, MA 01035

*Co-sponsored by UMass Extension, Massachusetts Department of Agricultural Resources (MDAR) and Community Involved in Sustaining Agriculture (CISA)*

**Cost is $35**

Price includes the required PSA Grower Manual ($50 value), a Certificate of Course attendance from AFDO ($35 value), certificate of attendance from UMass/MDAR and lunch and refreshments.

Participants will learn about produce safety best practices, key parts of the FSMA Produce Safety Rule requirements, and how these requirements will be enforced in MA through MDAR's Commonwealth Quality Program (CQP). There will be time for questions and discussion, so participants should come prepared to share their experiences and produce safety questions.

Fruit and vegetable growers and others interested in learning about produce safety and the Food Safety Modernization Act (FSMA) Produce Safety Rule should attend. The PSA Grower Training Course is one way to satisfy the FSMA Produce Safety Rule requirement outlined in § 112.22(c) that requires 'At least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration.'

Cost for lunch and materials is offset by support from CISA, MDAR and a grant from the USDA National Institute of Food and Agriculture

**REGISTER HERE:** https://www.regonline.com/builder/site/?eventid=1982371

Contact Lisa McKeag at lmckeag@umass.edu or 413-577-3976 for more information

## EPA Worker Protection Standard Update and Train the Trainer Workshops

**When:** Wednesday April 19

**Where:** Holiday Inn, 700 Myles Standish Blvd. Taunton, MA

**When:** Wednesday April 26

**Where:** Hadley Farms Meeting House, 41 Russell St, Route 9, Hadley, MA

**When:** Thursday April 27

**Where:** Radisson Hotel, 10 Independence Ave. Chelmsford, MA

*Hosted by the UMass Extension Pesticide Education Program*

The Environmental Protection Agency (EPA) has revised the 1992 Agricultural Worker Protection Standard (WPS) regulation. WPS contains requirements for training, decontamination, notification, and emergency assistance and specific information about personal protective equipment and Re-entry intervals (REIs).

All farm and horticulture workers must be trained under the EPA Worker Protection Standard (WPS) if your farm/greenhouse uses any pesticides, including, those approved for organic production and other general use pesticides.
The agricultural worker employer is responsible for complying with all components of WPS including the training of employees. This training can only be provided by an individual who has a pesticide certification license or has attended an approved EPA WPS Train-the-Trainer workshop.

With the support of the UMass Extension Risk Management Crop Insurance Education Program, the UMass Extension Pesticide Education Program is offering three workshops in April in Taunton, Hadley and Chelmsford.

There will be two sessions at each program: The first, EPA Worker Protection Standard (WPS) Update (10:00am start) is for farmers/growers and their employees. ****Two contact hours for private categories only.** The second session, EPA WPS Train-the-Trainer workshop (1:00-4:00pm) is for individuals who want to conduct annual EPA WPS training for their employees and pesticide handlers. This three hour workshop is intended for individuals who currently are unable to provide this training because they do not have a private pesticide certification. **If you are interested in becoming an EPA WPS approved Trainer *then you must register for both of these sessions*.** These workshops are also appropriate for organic farmers and their employees. ****There will be 2 contact hours offered as well for private certification categories only.**

## Sponsors





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