UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

Scouting some gorgeous beets interplanted with tomatoes at Lexington Community Farm in Lexington, MA this week!

Crop conditions

More than a typical spring frost, the freeze event of May 18 has caused extensive though variable damage across the state and region. Growers scrambled for days leading up to the freeze to find extra row cover and get vulnerable crops covered, prioritizing the most tender veggies like pumpkins, squash, and tomatoes which had already been planted out into the field. Even under covers these crops experienced some damage, as temperatures dropped quickly into the low 20's. These sudden low temps even caused damage to brassicas, which are among the more cold-tolerant crops. Several early successions of corn got zapped, whether under plastic or in the open field. On many farms, damaged plants needed to be replaced, or took a hit that will require time to recover from. On vegetable farms it is hard to quantify the impact that this damage will have on crop yields in the long run, but it's clear that every veg grower was impacted, since everyone needed to switch gears from planting and seeding to moving covers, almost no one has 0% damage, and in some cases whole plantings were lost.

Fruit growers also suffered major losses, as open blooms are very susceptible to temps below 30F. Apple and strawberry growers are set up to use frost protection, but this freeze also caused damage to blueberries, grapes, and pears, with 30-100% loss in these crops, depending on the crop and location. After the deep freeze in February, when nearly 100% of the peach crop was lost, this is a very hard way to start the season.

If you need help assessing the damage on your farm please contact us at UMass Extension. If you experienced significant damage (>30%) on your farm, the best thing to do is contact your county Farm Service Agency office to report the loss.

But the show does go on! Many CSAs are starting this week, and farmstands are filling up with greens, radishes, and the earliest summer squash and zucchini, and early day-neutral strawberries are coming in. Early high tunnel tomatoes are putting on flowers. And crews are out planting, planting, planting as the spring continues on!

Onion thrips on the inner leaves of an onion plant.

Pest alerts

Alliums

Low numbers of **onion thrips** adults and nymphs were seen feeding on onions in Middlesex Co., MA this week. Onion thrips feed on

Contact Us:

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

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onion foliage causing white stippling, and high populations can decrease yield and cause leaf deformation. Feeding damage allows for entry of bacterial pathogens which can lead to bacterial bulb rots later on. If you plan on spraying to control thrips, scout onion fields weekly by gently pulling leaves apart from each other to check within the plant. An insecticide application is warranted if 1-3 thrips/leaf are found (organic growers should use the lower threshold). The most effective material for organic growers is spinosad (e.g. Entrust). Apply with insecticidal soap (e.g. M-Pede, at the 1.5% v:v rate) to increase efficacy. Entrust can only be used two times in a row before rotating to a different insecticide class. Neem oil (e.g. Trilogy) and azadirachtin (e.g. Azatin O) may be effective also if applied when populations are still low. Pyrethrin (e.g. Pyganic) can provide knockdown control. Labeled conventional materials include neonicotinoids (e.g. Assail, Admire Pro), pyrethroids (e.g. Delta Gold, Declare, Warrior, Pounce, Mustang), spinetoram (e.g. Radiant), and spirotetramat (e.g. Movento). Movento and the neonicotinoids are systemic or translaminar and will work by ingestion; pyrethroids work on contact and will not have long residuals. Use an adjuvant with all materials to help materials adhere to waxy allium leaves, unless it says otherwise on the label.

Brassicas

Brassica flea beetles. Photo: M. Ng

Flea beetles are continuing to feed in unprotected brassica crops. There are at least 3 generations of FB and numbers may rise and fall over the course of the season, but since the generations overlap they are basically present all summer long. Young transplants can be protected with row cover, kaolin clay (e.g. Surround), or an insecticide. Non-waxy brassica crops like bok choy or mustard greens are preferred by flea beetles and can be planted alongside less-preferred waxy brassicas and sprayed regularly to function as a trap crop and reduce sprays to less preferred crops. Many pyrethroids (e.g. Fastac, Baythroid, Brigade, Asana, Danitol, Declare, Warrior, Pounce, Mustang) and neonicotinoids (Venom, Admire Pro, Actara, Platinum) are labeled, as well as Torac (group 21A). Diamides are also labeled (Exirel, Harvanta, Verimark for soil applications)—they have long residuals and will also control caterpillars, cabbage root maggot, and cabbage aphid. Spinosad (e.g. Entrust) is the most effective OMRI-listed product. Use a spreader-sticker to help sprays stick onto waxy brassica leaves.

Chenopods

Leafminer in Swiss chard. Photo: M. Ng

Beet and spinach leafminers are tunneling in beets and Swiss chard now, and the damage is high this year. Larvae mining within the leaves are protected from contact insecticides but systemic and translaminar pesticides will still have some efficacy. For conventional growers, group 5 (e.g. Radiant) and group 28 (e.g. Coragen, Exirel) materials are labeled for use on spinach, chard, and beets, and have translaminar activity to target larvae that have already tunneled between leaf layers. Blackhawk is labeled for use on beets only. Removing and destroying infested leaves (e.g. squishing or feeding to chickens, not just dumping into a cull pile, where the larvae will complete their life cycle) can help reduce the size of the subsequent generation of leafminers.

Cucurbits

Striped cucumber beetles were spotted in Franklin and Middlesex Cos. this week. Adult SCB overwinter in field edges near last year's crop, and potentially in high tunnels, and move into young cucurbit crops in late May/early-June. Severe feeding damage can stunt or kill young plants; the beetles also vector

a bacterial pathogen that causes the disease bacterial wilt. See the article in this issue for more information and management recommendations.

Solanaceous flea beetle damage on eggplant

Nightshades

Solanaceous flea beetle was seen in Middlesex Co. in eggplant this week. Solanaceous flea beetles prefer eggplant and only feed on nightshades; it is a different species than the brassica flea beetles. Controls include pyrethroids (e.g. Azana XL, Baythroid XL, Brigadier, Bifenture, Mustang Maxx, Warrior II), neonicitinoids (e.g. Admire Pro, Actara, Platinum), and diamides (e.g. Vermiark and Harvanta). If CPB are present, consider a non-pyrethroid (Delaware). Spinosad (e.g. Entrust) is the most effective material for organic growers but cannot be applied more than 2x consecutively; pyrethrin (e.g. Pyganic) will provide a quick knockdown of flea beetles for organic growers as well. Row cover or exclusion netting can also be used to exclude flea beetles early in production, before flowers develop.

Colorado potato beetle eggs on the underside of a potato leaf.

Colorado potato beetle adults are active in potato fields now, feeding, mating, and laying eggs. Adults overwinter in and around last year's eggplant and potato fields and emerge in mid-May to find new host crops, mate, and lay eggs. Crop rotation is essential, as CPB adults are poor flyers and do not travel far from overwintering sites near last year's crops. Cultural controls include row cover, trench traps, flaming, and mulching. For smaller plantings, hand-picking is effective. We've also heard good success stories of growers knocking beetles off of plants with a tractor-mounted board. See the potato insect management section of the New England Vegetable Management Guide for more info on cultural controls. Chemical control is most effective if sprays target the smallest larvae so begin scouting crops weekly now to catch when eggs begin to hatch. CPB populations readily develop insecticide resistance, so do not use the same chemical class on successive generations of CPB in the same year. In recent years, we have observed resistance to both neonicotinoids and synthetic spinosads in New England. Make 2 applications 7 days apart. Labeled conventional products include pyrethroids, neonicotinoids, novaluron (e.g. Rimon), cyromazine (e.g. Trigard), and diamides (e.g. Verimark, Exirel). For organic growers, Entrust is most effective but can only be used 2x on only 1 generation of CPB per season. Other options for organic growers include azadirachtin products (e.g. Aza-Direct, Azatin O, Neemix) or pyrethrin (e.g. Pyganic), and the bioinsecticide *Beauveria bassiana* (Mycotrol O or Botanigard).

Sweet Corn

European corn borer adults were caught in pheromone traps in Worcester, Bristol, and Norfolk Cos. this week, with a high of 5 moths captured in 1 week. This marks the beginning of the first flight of ECB, right on schedule with the GDD model that predicts the flight to begin at 374 GDD base 50°F. See Table 1 for trap captures and GDDs. ECB overwinters as larvae in infested crop debris, then pupates and emerges as adults in the spring. Adults prefer whorl stage corn for egg laying. Larvae will bore through the stalk, creating "shot-hole" damage, which we can expect to start seeing within a few weeks.

European corn borer adults (left), eggs (right top), and larva within a stem (right bottom). Photos: Clemson University USDA Cooperative Extension and J. Kalisch, Bugwood.org.

Multiple Crops

Ozone levels are forecasted to reach levels po-

tentially damaging to crops over the next few days. Vegetable crops vary in susceptibility to ozone damage, with potatoes, cucurbits, and beans being the most susceptible. Plants will grow out of moderate ozone injury. This factshet, Air Pollution Damage From Ozone in Vegetables Revisited, from Gordon Johnson of University of Delaware Cooperative Extension has useful descriptions of ozone damage in sensitive crops.

Slug damage was observed in a heavily mulched, no-till production system in Worcester Co. this week. Slugs are more common in mulched crops because they need to remain moist and the mulched ground provides excellent habitat for them. Baits like Deadline and Sluggo (OMRI-listed) are available for slug control.

Tarnished plant bug is active now. TPB feeds on a wide range of plants and particularly likes alfalfa; on diversified vegetable farms it is mostly an issue on strawberries and lettuce. TPB is not generally a seriously damaging pest unless the vegetation surrounding crop fields is serving as a source of large populations and the crop offers more succulent feeding than the surrounding fields. Avoid planting lettuce near abandoned, weedy fields or alfalfa crops. While alfalfa may serve as a trap crop, mowing alfalfa may cause TPB to leave mowed fields for nearby vegetables causing TPB populations to increase. See the appropriate crop insect control section of the New England Vegetable Management Guide for labeled pesticides.

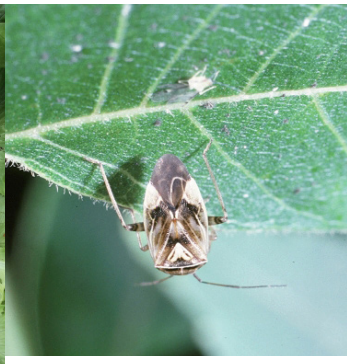
Table 1. Sweetcorn pest trap captures for week ending May 31

Location	GDD* (base 50°F)	ECB NY	ECB IA
Western MA			
Westfield	363	-	-
Chicopee Falls	328	-	-
Whately	364	0	0
Central MA			
Northbridge	294	-	-
Worcester	362	-	-
Eastern MA			
Bolton	345	5	0
Concord	311	-	-
Haverhill	327	-	-
Ipswich	282	-	-
Millis	-	1	0
Sharon	341	-	-
Sherborn	341	-	-
Seekonk	343	0	0
Swansea		3	0

- no numbers reported for this trap

*GDDs reported from the nearest weather station to the trapping site

Ozone damage on cucurbits. Photo: Long Island Horticultural Research and Extension Center

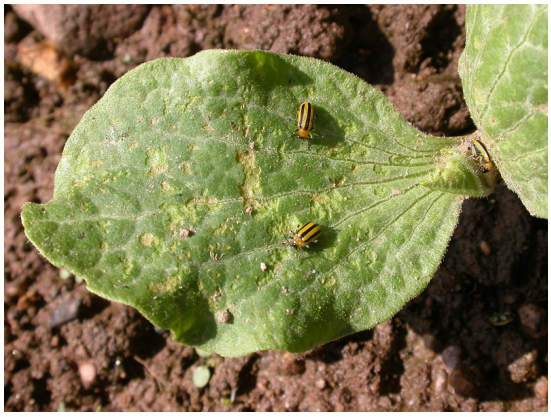


Tarnished plant bug (above) and damage to lettuce midribs (left). Photos: Univ. of CA and L. Tedders USDA Ag Research Service Bugwood.org

STRIPED CUCUMBER BEETLE: FOCUS ON EARLY CONTROL

As we head into the first week of June, striped cucumber beetles (SCB) are active and feeding on cucurbit foliage throughout New England. Adult beetles overwinter in plant debris at field edges and move rapidly into cucurbit crops with the onset of warm weather. High tunnel and greenhouse cucumbers draw beetles first, followed by early field crops. Densities can be very high, especially in non-rotated fields or fields close to last year's cucurbit crops. Adult beetles feed on cotyledons and young leaves, which can cause stand reduction, delayed plant growth, and reduced yield. They lay eggs in the soil near plant stems, and larvae feed on plant roots. This hidden damage reduces plant vigor and yield. Striped cucumber beetles also vector the bacterium *Erwinia tracheiphila*, the causal agent of bacterial wilt – this disease can be more damaging than direct feeding injury. It is important to focus on early, effective control to avoid yield impacts and to protect

pollinators.



Striped cucumber beetle on a cucurbit seedling.

Cultural controls

Crop rotation can reduce the impact of cucumber beetles, as can using **transplants**, and protecting young cucurbits with **row covers**. In addition to insect protection, row covers also provide extra early-season heat, though it is important to remove them during flowering to allow for pollination. Insect netting prevents beetle damage and does not trap in heat.

Perimeter trap cropping is another cultural control that has been shown to reduce or eliminate main crop sprays while providing effective beetle control. Trap cropping exploits the fact that SCB are more attracted to *Cucurbita maxima* crops (e.g. buttercup and hubbard squashes and giant pumpkins) than *C. pepo* or *C. moschata* crops (e.g. pumpkins, summer squash, butternut squash, other winter squash). Note that some specialty pumpkin varieties are *C. maxima* types and very attractive to beetles. Plant 1 or 2 rows of a *C. maxima* variety in an unbroken perimeter around the field. Always use 2 rows near woods or last year's fields, and space plants no wider than the between-row spacing that is used in the main crop. Do not use a crop that is highly susceptible to bacterial wilt (see next paragraph) in the border. Beetles must be killed in the border, either by applying foliar insecticide when beetles first arrive or using a systemic insecticide at planting. Scout both borders and main crop to assess beetle numbers regularly. Repeat perimeter-sprays if needed to prevent influx into the main crop, and spray the main field if thresholds are exceeded. Attractive crop types that are planted in rows within the main field also work as trap crops that draw beetles as they move within the field. These trap crops can be selectively sprayed.

Bacterial wilt in squash

Beneficial nematodes: Some growers have expressed recent interest in applying entomopathogenic nematodes to the soil to control SCB. These nematodes would target the soil-dwelling, larval stage of SCB. Significant research has not been done on this topic, but theoretically it would be difficult to successfully control SCB using nematodes because of the high populations of SCB in the environments surrounding a field—if the SCB larva in the soil in a field were successfully killed, more adults will continue coming in from field edges throughout the season.

Insect netting in high tunnels: SCB can be especially damaging early in the season in high tunnels. An increasing number of growers are experimenting with covering high tunnel sides and doorways with insect netting to exclude SCB. We've heard some success stories with this tactic, and some frustrations about ripping expensive netting, reduced airflow in netted tunnels, and incomplete exclusion that leads to resident high tunnel SCB populations. One way to increase success with this tactic is to combine it with crop rotation out of cucurbits in a netted tunnel so that the beetles that do make it into your tunnel one year will be unable to find food the following year. Consider using shade cloth to reduce heat in the tunnel when netting is used.

Scouting and thresholds. Cucurbit plants at the cotyledon and 1-to 2-leaf stages are more susceptible to infection with bacterial wilt than older plants. Thus, it is especially important to keep beetle numbers low before the 5-leaf stage. Scout frequently (at least twice per week up to SCB emergence, and for two weeks after) and treat after beetles colonize the field. Scout at least 25 plants to monitor the number of beetles and damage. Use this UMass Cucurbit Scouting Form to help keep track of what you find. The economic threshold depends on the crop. To prevent bacterial wilt in highly suscep-

tible crops such as cucumber, muskmelons, summer squash, and zucchini, we recommend that beetles should not be allowed to exceed 1 beetle for every 2 plants. Less wilt-susceptible crops (butternut, watermelon, most pumpkins) will tolerate 1 or 2 beetles per plant without yield losses. Spray within 24 hours after the threshold is reached. Proper timing is key.

Conventional foliar insecticides

There are a number of broad-spectrum conventional insecticides which can be used for foliar control, including carbamates, pyrethroids, and neonicotinoids. All are highly toxic to bees and should only be used before bloom. Avoid using foliar neonicotinoid sprays (Actara [thiamethoxam] or Assail 30SG [acetameprid]) if systemics in the same class were used (see below). See the cucurbit insect management section of the New England Vegetable Management Guide for more details.

Systemic insecticides. Two neonicotinoid products, imidacloprid (multiple trade names) and thiamethoxam (Platinum) are registered for use in cucurbits as an in-furrow, banded, drench, or drip irrigation application to the seed/seedling root zone during or after planting/transplanting operations. Note specific application methods and rates on label. Commercially applied seed treatments (e.g. thiamethoxam, Farmore) are also available for early season control.

Cucurbit treated with Surround

Organic insecticides. Kaolin clay (Surround WP), pyrethrin (Pyganic Crop Spray 5.0 EC), and Azera (mixture of pyrethrin and azadiractin) are labeled for SCB. Surround does not kill the beetles but instead acts as a physical deterrent. With direct-seeded crops, apply Surround as soon as seedlings emerge if beetles are active. Transplants can be sprayed or dunked before setting out in the field. As with other insecticides, Surround must be re-applied after heavy rain and on new growth. Pyganic is a contact insecticide that provides a short-term knock-down with no residual effect. Spinosad (Entrust) is not labeled for and is not effective against SCB.

Reducing risk to pollinators: The New England Vegetable Management Guide describes many steps that growers can take to protect honey bees and native pollinators when using insecticides. The issue of neonicotinoids in particular has received a great deal of attention in recent years. This is a group of insecticides that have a chemical structure very similar to nicotine. They have been widely used in agriculture because they are effective against a wide range of insects, have lower mammalian toxicity compared to older classes of insecticides, and because they can be absorbed by roots and moved through the entire plant, reducing the need for foliar sprays. This trait allows for applications to be made to soil or on seeds, with less exposure to humans and to natural enemies of insect pests. Neonicotinoids are highly toxic to bees, and label requirements prohibit use on blooming crops or where there are blooming weeds or borders. Additional concern about impact on bees arises because research has shown that detectable, low concentrations of neonicotinoids can move into pollen or nectar. These are present at sublethal concentrations but may affect the foraging behavior of bees or suppress their immune system. The long-term or colony effects of sublethal concentrations of neonicotinoids are difficult to assess in the field because bees from each colony travel long distances and forage in many different habitats and types of plants. In cucurbits, both native bees (e.g., squash bees and bumblebees) and honey bees visit flowers to gather both pollen and nectar and are essential to crop pollination. Research in cucurbits has shown that higher levels of neonicotinoids were found after foliar treatments and chemigated insecticides were applied during flowering. Lower levels were detected in treatment regimens that involved a single application at planting via seed treatment, a drench application to transplant trays, or transplant water treatment. Thus, growers should avoid high rates and multiple applications, especially through trickle irrigation as the crop approaches flowering.

--UMass Extension Vegetable Program

Soil moisture sensors: a tool for smart irrigation management decisions

--Written by Jeremy DeLisle, UNH Cooperative Extension Fruit & Vegetable Production Field Specialist

Understanding the effects of rainfall and irrigation events on soil moisture provides critical insight for growers about the present growing environment for their crops. While experienced growers have learned over seasons of observations how their soils and water interact, utilizing a soil moisture measuring device of some sort enables them to put a number on their observations and more accurately track trends over time.

In 2018, UNH Extension began partnering with eight farms in Merrimack and Belknap counties to install soil moisture sensors in a variety of crops including a high-density apple planting, highbush blueberries, field-grown mixed greens, high tunnel tomatoes, field-grown peppers, and Christmas tree seedlings.

Monitoring soil moisture levels on these same farms continued during the 2019 production season, and growers reported that the information they gained as a result of monitoring was very beneficial. Some growers plan to purchase their own set of sensors and accompanying reader once our project concludes.

Grower Feedback

The information that has been gained from a grower's perspective throughout this project has been quite diverse. There were instances where irrigation cycles were occurring too often and for far longer periods than needed to achieve field capacity of the soil. There were also instances where the use of sensors revealed malfunctioning irrigation system components by reporting unusually dry soil in areas that should have received ample irrigation.

The sensors have allowed growers to more accurately determine the frequency and duration of irrigation events needed, based on soil moisture trends, and maintain adequate moisture for the crops being grown. On many occasions, information from the sensors resulted in growers waiting an extra day or two to irrigate, avoiding unnecessary irrigation. The goal of this project is to provide growers with a useful tool and information resulting in a higher level of water use efficiency.

Sensor Types

The sensors used fall into the category of GMS (Granular Matrix Sensors). This category of sensors provides a reading based on the electrical resistance between two electrodes embedded in the granular matrix within the sensor. The more soil moisture available in the soil, the lower the resistance and the corresponding number on the reader. This resistance reading is reported in kilopascals (kPa) or centibars. Both of these readings are equal as a resistance measurement. The specific sensors we are using in our fieldwork are WATERMARK model 200SS.

Soil Moisture sensors are used to track soil moisture levels for better crop production. Photo: J. DeLisle

As an example, a reading of zero would tell us that we have a fully saturated soil, while a reading of fifteen would be somewhat drier. It helps to think about these numbers in the sense of how hard the plant has to work to pull water from the soil.

Another traditional instrument used to measure soil water tension, the tensiometer, is designed to simulate a plant root and provides the same units of measurement as the WATERMARK sensors. The WATERMARK sensors have been calibrated to provide readings based on the format of soil water tension, defined as the force necessary for plant roots to extract water from the soil. Therefore, the readings from both the tensiometer and WATERMARK sensors are easily comparable.

Think for a moment about the implications of how this data could be used by growers to help minimize plant stress or disease caused by excess moisture, or how important adequate moisture is for efficient nutrient uptake by the plants. You can begin to see how the readings provided by these sensors can be utilized to fine tune irrigation management strategies and to better manage the growing environment for specific crops.

Installation

Proper installation of the WATERMARK sensors can be accomplished in several ways. Here in New Hampshire, we've

Sensor depth can be adjusted depending on the rooting depth of the crop. Photo J. DeLisle

A handheld reader provides instant data useful for irrigation management decisions. Photo J. DeLisle

been closely following the manufacturer's instructions. Simplified, the standard sensors come with a two-wire lead measuring five feet long. This lead is threaded up through a section of PVC pipe of the desired length depending on your intended sensor depth in the field, glued in place with PVC glue, then capped with another section of larger diameter PVC with a cap and slid over the top to keep moisture out of the tube.

Before installing the sensor in the field, there is a recommended wetting and drying process that needs to be followed to ensure the sensors quickly responds to changing moisture conditions. Good soil contact with the sensor is essential to ensure accurate readings.

Follow the manufacturer's instructions to ensure proper installation. Sensors can quickly and easily be moved from one location to another to better understand the dynamics of soil moisture in relation to soil types, irrigation cycles, topographical changes, etc., so long as the installation instructions are followed with each move.

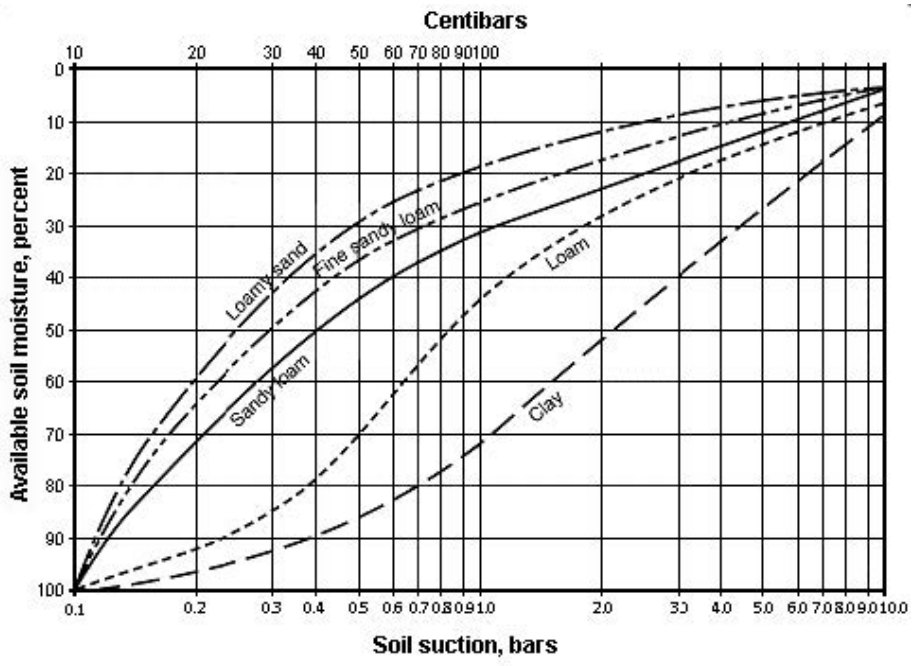
Interpreting the Readings

To take readings using these sensors, growers need access to a digital data reader which simply connects with clips to the end of each wire lead. The cost of these readers is $250 as of June 2023. Each sensor costs $40-44, and a pair of two is recommended for each location. Having two sensors allows growers to better understand the effects of irrigation at varying depths within a planting or block. Sensor depth can be adjusted depending on the rooting depth of the crop.

Established recommendations for soil moisture in specific crops and soil types are available. These recommendations provide growers with additional information on which to base their irrigation decisions. In most soils, other than heavy clay, the decision to irrigate would generally happen with sensor readings in the range of 20 to 40 kPa. Differences in soil type should be considered when determining the appropriate range for irrigation.

This is because different soil types have varying levels of plant-available water at various soil moisture readings. To clarify, a soil moisture tension reading of 40 kPa in a sandy loam would mean that approximately 50 percent of the water in the soil is available to the plant. Comparatively, a loamy sand soil would have only 35 percent plant-available water at the same 40 kPa reading (see chart).

This reinforces the importance of knowing



This chart is used with permission (from the BC Trickle Irrigation Manual, Irrigation Industry Association of British Columbia (T.W. Van der Gulik) and was adapted by R. Shortt, et. al, in the publication Monitoring Soil Moisture to Improve Irrigation Decisions published by the Ontario Ministry of Food and Rural Affairs.

Note: 1kpa = 1 centibar; 100 centibars = 1 bar

the soil type, along with monitoring soil moisture and visually observing crops and soil to make an informed irrigation decision. Additionally, the method of irrigation should also be considered.

For example, it is recommended to begin overhead irrigation when the available soil moisture is no less that 50 percent, while drip irrigation, taking comparatively longer to distribute substantial volumes of water, could be started before the plant-available water drops below 80 percent. Using the sandy loam example from above, this would mean that a reading of 17 kPa would trigger a drip irrigation event.

Editor's Note: Since this article was written, many growers we work with in MA have adopted these technologies. A lot has also changed, and sensor technology and automation has become more widely available and widely used. We will have two Twilight Meeting's this summer to demonstrate irrigation sensors and automation and look forward to seeing these systems in action.

WHEN IS BLACK PLASTIC MULCH TOO HOT FOR VEGETABLES?

--Written by Gordon Johnson, Extension Vegetable & Fruit Specialist; gcjohn@udel.edu and Emmalea Ernest, Scientist - Vegetable & Fruit Crops; emmalea@udel.edu

High temperatures (90°F or higher) coupled with clear skies can lead to heat buildup on the surface of black plastic mulched soils. We have found temperatures of over 140°F at the surface of black plastic mulch. This can cause losses with transplants because stems near the mulch are damaged by the high heat. In crops seeded through the black mulch, germination is often reduced, and if plants do emerge, they can be killed by the excess heat.

Another problem is high soil temperatures under black mulch which can lead to fruit quality issues in tomatoes and peppers. In onions, black mulch can cause damage to bulbs due to excess heat. Late spring planted peppers are very susceptible to stem heat necrosis on black plastic mulch (Fig. 1). This is where the high temperatures at the mulch surface causes damage to the stem, often causing plants to collapse. When daytime temperatures are in the high 90s, the surface of black plastic mulch can be as high as 140°F, which will kill plant cells.

Figure 1. Pepper transplant with stem girdling from heat necrosis. Photo: G. Johnson

There are several strategies that can be used to reduce stem heat necrosis. Larger transplants with thicker stem diameters are less susceptible to damage. Make a larger hole when transplanting and make sure the plastic mulch does not touch the stem of the transplant. White particle films (clay or lime based) sprayed at the base of plants over the mulch can also reduce plant losses to heat necrosis. Putting a small mound of clean sand around the plant stem will also eliminate this problem.

Shade cloth is another potential strategy for reducing stem necrosis. In a 2022 trial conducted by the UD Extension Vegetable Program, 30% black shade cloth was very effective in preventing pepper transplant loss. The shade cloth was applied on June 1, the same day as transplanting. In the shaded plots there was 97% stand 49 days after transplanting; however, in unshaded plots only 64% of the transplants survived. The shaded treatment also had larger plants (Fig. 2) which eventually produced significantly higher marketable yields.

Switching to white plastic mulch for later spring plantings can reduce losses significantly (white plastic will be 10-20°F cooler than black plastic mulch). White mulches can lower bed temperature by up to 20°F. Use of white mulch increases transplant survival and increases germination and survival of seeded crops. The cooler soil can also increase root function and reduce fruit disorders such as white tissue, blotchy ripening and yellow shoulders in tomatoes and blossom end rot in tomatoes and peppers.

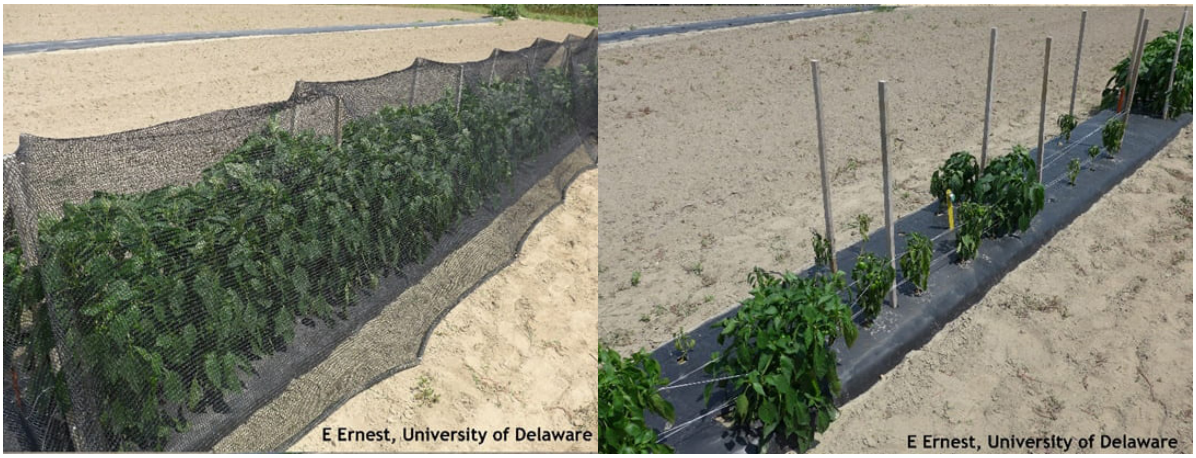


Figure 2. Pepper plants that were shaded immediately after transplanting (left) had higher stand establishment and greater plant vigor than unshaded plants (right). Photos: E. Ernest

In onions, cutting the black mulch in mid-June as bulbs are increasing size has been shown reduce to reduce bulb damage.

In the past, a rule of thumb has been to switch to white mulch in the middle of June when days are longer and air temperatures are higher for longer periods of time. White mulch should also be used for crops planted in July and the first half of August.

The most common mulch used is white on black. The black side reduces weed germination, and the white top reflects solar radiation thus cooling the surface and the soil beneath.

Is there an advantage to switching earlier? Up to the middle of May, black plastic (or other soil heating colors) should be the preferred mulch to get warm season vegetable plants off to a good start when soil temperatures can be variable and bed heating improves crop performance. The second half of May can see some very hot weather as can the beginning of June, but this varies from season to season. Past research has shown no benefits to using white mulch in this period and often reduced crop performance in warm season crops such as watermelons. If long range forecasts are for warmer than normal temperatures, laying white or reflective plastic earlier in June may be advised for sensitive crops.

White mulches have also shown benefits in spring and summer planted cool season crops such as broccoli, lettuce, onions, and day are longer and air temperatures are higher for longer periods of time. White mulch should also be used for crops planted in July and the first half of August.

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White mulches have also shown benefits in spring and summer planted cool season crops such as broccoli, lettuce, onions, and day neutral strawberries planted in April.

News

UMass Extension is Hiring!

The **UMass Extension Fruit Team** is currently hiring one **Extension Educator III (MS-level)**. The successful candidate for the Educator III position will have expertise in tree or small fruit crop and pest management and will work with other members of the Fruit Team to provide science-based educational programming and technical assistance to commercial fruit growers in MA and conduct applied research on relevant crop and pest management topics. Special consideration will be given to candidates with expertise in plant pathology and/or small fruit production.

The default location for this position is the UMass Amherst campus, with opportunities for hybrid work arrangements. This position will remain open until filled. For more details please see the full position descriptions linked below.

Priority deadline: June 12, 2023

For more details and to apply: **Fruit Extension Educator III:** https://careers.umass.edu/amherst/en-us/job/518181/fruit-extension-educator-iii-umass-extension

Application Period Open for USDA Rural Energy for America Program (REAP)

The USDA is accepting applications for grants to help agricultural producers and rural small businesses invest in renewable energy systems and make energy-efficiency improvements. USDA is making the $1 billion in grants available under the Rural Energy for America Program (REAP) funded under the Inflation Reduction Act. For application information, eligibility and deadlines see, Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants.

FDA releases FSMA Traceability Rule Small Entity Compliance Guide

On November 21, 2022, FDA published the final rule entitled, "Requirements for Additional Traceability Records for Certain Foods" (Food Traceability Rule). Details about the regulation can be found here.

This guidance document is intended to help small entities, including farms and small businesses, comply with the requirements of the Food Traceability Rule as established in 21 CFR part 1, subpart S. The regulations are binding and have the full force and effect of law. FDA's guidance documents, including this guidance, do not establish legally enforceable responsibilities. Instead, guidances describe our current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word should in FDA guidances means that something is suggested or recommended, but not required.

Access the Guidance Document here.

Fruit and Vegetable Grower Feedback Needed on Produce Safety Costs, Needs, and Barriers

The Produce Safety Alliance (PSA) Team and personnel from the Northeast Center to Advance Food Safety (NECAFS) at the University of Vermont would like to understand the costs and the barriers of beginning or expanding food safety practices on farms and in packinghouses to make educational materials more relevant to fruit and vegetable growers and packers. To do this, we have developed a survey to collect food safety information from fruit and vegetable growers across the country.

What are the Goals of this Survey?

To understand:

- what steps growers have taken toward adopting food safety practices on their farm,
- the costs of adopting food safety practices (both one-time and reoccurring), and
- where growers have questions about food safety.

Why Should You Participate?

The detailed information that is provided will allow future educational materials to be tailored to specific challenges that growers are facing.

Who Should Participate?

We are looking for feedback from people involved in fruit and vegetable production and packing, including those who have and who have not adopted food safety practices. This survey should be completed by someone who has knowledge about the operation's produce safety practices (e.g., equipment, finances, supplies, training, market distribution, third-party audits).

Participation is voluntary and anonymous. It will take 10 – 30 minutes to complete the survey, depending on the farms' food safety practices.

By completing this survey, you can choose to be entered into a raffle to win a $75 prepaid credit card. Ten participants will randomly be selected to win. The raffle will be held when the survey closes, approximately June 1st. If selected, you will be contacted to confirm your mailing address and acknowledge acceptance of the $75 prepaid credit card.

English-language survey: https://qualtrics.uvm.edu/jfe/form/SV_agW9o6VWOUCivCC

Spanish-language survey: https://qualtrics.uvm.edu/jfe/form/SV_agW9o6VWOUCivCC?Q_Language=ES

Events

SEMAP Twilight Meeting: Wash-Pack Facility Best Practices

When: Thursday, June 8, 5-7 pm

Where: Langwater Farm, 215 Washington Street, North Easton MA 02356

Registration: Free! Click here to register.

Join Southeastern MA Agricultural Partnership (SEMAP) for a twilight meeting on best practices for wash-pack facilities at Langwater Farm in North Easton, MA. Together with **MDAR's Produce Safety Team,** Langwater staff will walk us through their facilities, talk about how they got there, and identify what works & what doesn't. All are welcome; commercial farmers are especially invited.

Eastern MA CRAFT Meetings with UMass Extension

Pest and Disease Control Field Walk

When: Wednesday, June 21, 4-6pm, Pest and Disease Control with UMass

Where: High Road Farm, 186 High Rd., Newbury, MA. Please drive down the private driveway and you'll see parking options near the barn and greenhouse.

Join Sue Scheufele of the UMass Extension Vegetable Program and Eastern MA CRAFT (Collaborative Regional Alliance for Farmer Training) for a pest walk at High Road Farm in Newbury, MA. We will tour the farm and discuss pests that are currently active, how to scout for them, and how to manage them.

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

When: Saturday, October 21, 4-6pm

Where: Farmer Dave's, Dracut, MA

UNH Extension and New Hampshire Vegetable & Berry Growers' Association Wash and Pack Shed Twilight series

The Day in the Life of a Wash Pack Shed: Part 1

When: Thursday, June 22, 5:30 - 7:45pm

Where: Wilson Farm, 144 Charles Bancroft Highway, Litchfield, NH 03052

This meeting will touch on the daily flow of product through the pack shed, record-keeping systems, water management, and daily sanitation. A special focus will be on Wilson Farm's SOPs and the process for maintaining and cleaning its brush wash conveyor.

Attendees will also get a chance to see the farm's newly constructed Pesticide Storage facility. Join extension specialists in a conversation about facility construction, and pesticide mixing and loading considerations. See firsthand how a well-designed pesticide storage shed can help prevent accidental exposure to pesticides, protect the environment, and maintain the quality and effectiveness of the chemicals.

For the full agenda, see: Wash and Pack Shed Meeting Part 1

The Day in the Life of a Wash Pack Shed: Part 2

When: Tuesday, July 11, 5:30 - 7:30pm

Where: Longview Farm, 175 Quincy Rd, Plymouth, NH 03264

Longview Farm finished construction on a new wash pack shed in 2021. The owners will discuss the construction, design, and flow decisions that went into re-modeling a dairy barn into a working wash pack shed. We will also discuss the farm's process and equipment for washing vegetables and practical factors to consider when adding sanitizer to the wash water. Bring your questions and experience!

For the full agenda, see: Wash and Pack Shed Meeting Part 2

2023 UMass Extension Vegetable Program Twilight Meetings – Save the Dates!

Automated irrigation systems, pumpkin varieties, and sweet corn IPM at Parlee Farm

When: Tuesday, August 15

Where: Parlee Farm, Tyngsboro, MA

South Deerfield Research Farm Field Day

When: Wednesday, August 16

Where: UMass Amherst Crop and Animal Research and Education Farm, South Deerfield, MA

Come hear about active research going on at the farm, including Vegetable Program trials on heat mitigation strategies, cucumber and basil downy mildew resistant varieties, sprayer technology, and more! We'll also have a presentation on automated irrigation systems from Toro.

Sweet potato production and fall pest management with Heart Beets Farm

When: Thursday, September 21, 4-6pm

Where: Heart Beets Farm, Berkley, MA

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Vegetable Notes. Genevieve Higgins, Lisa McKeag, Maggie Ng, 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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