UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

We're excited to welcome Hannah Whitehead to the team as another Extension Educator with the Vegetable Program!

Crop conditions

It's been a wet week out there after so much dry. Tropical storm Elsa made landfall further down the east coast yesterday and the Northeast is experiencing related thunderstorms and heavy rains Some places saw hail and there have been scattered power outages around the state over the last few days. We have yet to hear reports of hail damage, but let us know how your farms fared through the storms! Weeds are a big focus now for farms. These unwanted plants loved the heat last week just as much as your crops did and all the rain has made it tough to get into fields to cultivate. Harvests are in full swing with all the leafy greens, and early root crops and heading brassicas coming out, along with the season's first sweet corn.

A brief reminder that we are collecting feedback on how you use the New England Vegetable Management Guide–if you use the hard copy or online version of this guide in any way, please take this short survey to inform our future editions, and thanks in advance!

This is a big week for the Vegetable Program as we welcome our new Extension Educator, Hannah Whitehead! Here are a few words of hello from Hannah:

> Hi! I'm excited to join the UMass Extension Vegetable Team. I've been an independent Extension Educator here at UMass for three years, with a focus on honey bees and pollinators. Before joining UMass, I received my master's in Environmental Science from The Ohio State University, and worked on vegetable farms in Chicago, Northeast Ohio, and Vermont. I'm excited to return to the vegetable world, and to work with all of you.

We hope you get a chance to meet her in person soon, either on your farm or at one of our upcoming (non-virtual!) events. Your first opportunity will be the UMass Research Farm Field Day on Tuesday, July 27. There's a long list of projects happening at the farm this year, including research on cover crops, organic controls for wireworm, Cercospora leaf spot, and Alternaria leaf spot, and many more. See the events section at the end of this issue for a link to registration information and a complete list of topics. We've also got a twilight meeting in the works for August in northeastern MA–stay tuned for details, and we look forward to seeing you in the field!

Pest alerts

Alliums:

Onion thrips numbers continue to build in untreated onion fields. There are several conventional materials labeled for control of thrips and numbers may be lower now for growers using some of these products in rotation, such as the one described in the 2020 Cornell Vegetable Program guidelines. Producers relying on OMRI-approved materials have fewer options. Spinosad (e.g. Entrust) remains the most effective, though reliance on one product does increase the risk that resistance may develop in the population. Another material that can be rotated or tank mixed is neem oil (e.g.,

Contact Us:

Contact the UMass Extension Vegetable Program with your farm-related questions, any time of the year. We always do our best to respond to all inquiries. **Office phone:** (413) 577-3976 *We are currently working remotely but checking these messages daily, so please leave us a message!* **Email:** umassveg@umass.edu

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

Trilogy). Azadirachtin (e.g. Azatin O), which is a derivative of neem oil, can be effective if applied early, and pyrethrin (e.g. Pyganic) can provide knockdown control. Heavy rains—or a blast from a hose—can knock thrips off of the leaves and reduce populations.

So many onion thrips!
Photo: C. Goossen

Beans:

Potato leafhopper adults and nymphs are present in bean fields and affected plants are showing signs of hopperburn. Treatment may be required if scouting reveals more than 1 nymph per leaflet or 5 adults per foot of row. For organic producers, Azera is effective, though several applications are necessary to achieve control. Azera is a pre-mix of azadirachtin and pyrethrins and has been shown to be more effective than Pyganic alone. Growers can mix Pyganic and azadirachtin themselves and use the higher labeled rate of Pyganic to get better control; buying both products separately allows for greater flexibility.

Brassicas:

The usual suspects at this time of year – flea beetles, imported cabbageworm, and diamondback moth – are all continuing to do damage. See the article in this issue for more information on the caterpillar pests of brassica crops.

Alternaria leaf spot (left) and black rot (right) in brassicas.

Foliar diseases like Alternaria leaf spot and black rot can be expected to spread after all of the recent rain. The fungal pathogen that causes Alternaria leaf spot is spread by splashing water, insects (another reason to control flea beetles!), and equipment and workers moving through the field. Disease spread may be inevitable with all of this rain, but minimizing working in fields with wet foliage can help slow the spread.

Symptoms and signs of cucurbit downy mildew.
Photo: G. Higgins

Cucurbits:

All of MA is currently at **high risk** for cucurbit downy mildew development, with the recent storms potentially blowing both wet weather and inoculum northward and eastward. The closest reports of CDM are on cucumber, in DE, NJ, and MD. There are reports on watermelon, squash, and cantaloupe further south. Growers should be applying protectant fungicides now (e.g. chlorothalonil, copper, mancozeb) and scouting regularly for symptoms of CDM—interveinal chlorosis on the tops of leaves and fuzzy gray sporulation on the undersides of leaves. If you confirm CDM in your crop, add a targeted CDM material. Please report any suspected cases of CDM to us at umassveg@umass.edu so we can track the disease.

Squash vine borer larva
Photo: J. Boucher

Squash vine borer moths are continuing to be captured in pheromone traps across the state. Damage from larvae within stems has not been reported yet but can be expected to be seen soon. Moths lay eggs at the base of the plant and the larvae bore into the stem, leaving behind sawdust-like frass and a small entry hole. As

Table 1. Squash Vine Borer trap captures, week ending July 7, 2021	
Location	**SVB**
Deerfield	7
North Easton	25
Westhampton	2
Whately	1
Sharon	-
Leominster	15

the larva feeds within the stem, the plant will collapse. The larva can be found if the stem is cut open. Timing of sprays to the base of plants is key for this pest since larvae must be targeted before they are able to enter stems. Spray if more than 5 moths (for bush-type crops) or 12 moths (for vining types) are caught in traps on your farm.

Solanaceous:

Blossom end rot (BER) is continuing to be reported in MA in tomato and peppers. BER is caused by calcium deficiency in the developing fruit and is most often caused by drought conditions during fruit development and not by calcium deficiency in the soil. Providing sufficient water to tomato plants, especially high tunnel crops, will help avoid this disorder.

Sweet Corn:

European corn borer trap counts are continuing to decrease. Corn earworm (CEW) is still being caught in some locations while other locations are reporting 0 moths. We are likely seeing the end of the flight of CEW moths that overwintered nearby in NY. The recent storms from the south can be expected to blow up moths from southern overwintering sites, so we will likely see higher trap counts in the next few weeks. Fall armyworm traps are up in four locations across the state but no traps are currently catching moths.

Miscellaneous:

Two growers in MA reported **slime molds,** on sweet potato on one farm and the lower leaves and stem of tomato on another farm. These odd fungus-like organisms are favored by prolonged periods of leaf wetness and feed not on the plants but on microorganisms that might be on the plant surface. They are unlikely to cause damage and should dry up when the weather does.

Tortoise beetles were reported causing feeding damage on

Table 2. Sweetcorn pest trap captures for week ending July 7, 2021					
Location	**GDD (base 50°F)**	**ECB NY**	**ECB IA**	**CEW**	**CEW Spray Interval**
Western MA					
Deerfield	1129	-	-	9	*4 days*
Sheffield	886	-	-	-	-
Southwick	1081	0	0	0	*no spray*
Whately	1171	1	1	0	*no spray*
Central MA					
Bolton	1110	1	3	1	*no spray*
Leominster	1098	1	0	2	*6 days*
Northbridge	1003	0	0	0	*no spray*
Spencer	1082	0	0	0	*no spray*
Eastern MA					
Ipswich	1046	0	0	0	*no spray*
Concord	1106	0	0	0	*no spray*
Millis	-	1	0	4	*5 days*
North Easton	1108	0	1	2	*6 days*
Sharon		1	0	2	*6 days*
Seekonk	1233	0	0	0	*no spray*
Swansea		3	0	4	*5 days*
- no numbers reported for this trap N/A this site does not trap for this pest					
*GDDs are reported from the nearest weather station to the trapping site					

Slime mold on tomato leaf. Photo: J. Ward

Tortoise beetle larvae (left) and a golden tortoise beetle adult. Photos: D. Swanson and L. Pundt

tomatoes this week. There are several species of tortoise beetles that feed on a range of crops, including solanaceous crops and sweet potatoes. There is only 1 generation per year of the beetles. They are most commonly found in home gardens and rarely cause extensive damage.

VERTICILLIUM WILT

Symptoms of verticillium wilt have been observed on eggplant in MA this season. Verticillium wilt is caused primarily by two fungi in the genus *Verticillium*. These pathogens are soil-borne and can persist in soils for long periods of time without a susceptible host, making disease management difficult. Verticillium wilt can affect many vegetable and ornamental crops and has many weed hosts as well, but eggplant is particularly susceptible.

Characteristic one-sided yellowing/wilt caused by Verticillium in eggplant.
Photo: K. Holmstrom

Early stages of verticillium wilt result in a one-sided yellowing , wilting, or scorching. *Verticillium* spp. usually infect a limited section of plant roots and colonize the water-conducting cells above that point, blocking the flow of water to certain sections of the plant. Symptoms of the disease therefore initially appear in only one branch or one side of a leaf because other water-conducting "pipes" remain un-colonized and can conduct water normally. In contrast, other root and crown rot pathogens like *Pythium, Phytophthora, Rhizoctonia, Sclerotinia* infect all stem tissue, resulting in the entire plant wilting.

Verticillium spp. also generally cause a brown discoloration of the vascular system, especially at the base of the stem. The discoloration can be observed by splitting the stem down the middle; the vascular system is just under the outer skin of the plant, not in the center.

Vascular discoloration caused by Verticillium wilt (above) and a healthy vascular system (below).
Photo: R.L. Wick

However, vascular discoloration and one-sided wilting can also be symptoms of fusarium wilt, caused by another soil-borne fungus in the genus *Fusarium*. It is important to identify which of the two fungi is infecting your crop, because their host ranges are quite different. Verticillium wilt tends to affect a wide range of hosts and can infect many unrelated plants. *Fusarium* spp., on the other hand, have very narrow host ranges; a particular species or strain can only infect one crop. For example, an isolate of verticillium wilt from potato can infect a maple tree. By contrast, the *Fusarium* spp. that infects tomato cannot infect basil and vice versa. Therefore, it can be very helpful to know for sure which pathogen is affecting your crop so that you can plan an appropriate crop rotation. It is difficult to determine which fungus is causing disease in your field using field observations alone, so we recommend submitting whole-plant samples to a diagnostic lab. See here for information on how to submit a sample to the UMass Plant Disease Diagnostic Lab.

Both fusarium and verticillium wilt pathogens can survive in the soil for many years after being introduced. *Verticillium* spp. produce microsclerotia—masses of compact hyphal cells that are highly resistant to desiccation and UV light. In the presence of susceptible hosts, microsclerotia will germinate and infect. Disease development is favored by moist soils and temperatures between 70 and 81°F.

Verticillium wilt is primarily spread through infected plant material—transplants and potato seed. The fungus is soil-borne and does not easily move around the field. Plowing and harrowing will spread the pathogen down the row a bit, but the pathogen will likely not spread throughout a field during the season the way a fungus that produces wind-blown spores can. Nevertheless, continuous planting of susceptible crops will build up the population density of *Verticillium* and reduce yield of subsequent crops.

Because verticillium wilt has such a wide host range, it can be difficult to rotate away from susceptible hosts. The list of crops susceptible to verticillium wilt is very long and includes vegetables, flowers, herbaceous perennials and trees. Vegetable crops that verticillium has been reported on include brassicas (cabbage, radish), cucurbits (cucumber, melons), solanaceous crops (eggplant, tomato and potato), peppermint, and lettuce, with the most extensive reporting on solanaceous crops. There is also a strain that attacks peppers, but that strain has not been seen in the eastern US. When *Verticillium* is confirmed in a field, we can only advise to plant crops that are known to be resistant to the fungus as a whole. Vegetables that are resistant to verticillium wilt include asparagus, beans, peas, and corn. Most grasses are also resistant—so including grass cover crops in rotations can be helpful.

Management:

- There are no effective chemical controls.
- There are several **biopesticides** labeled for verticullium wilt, although no efficacy data is available. These materials may provide some degree of control as part of an overall management program. See here for a list of biopesticides and search the text for 'verticillium' for labeled products.
- **Maintaining adequate soil moisture and fertility** can help diseased plants survive.
- **Crop rotation** is most effective if used preventively to stop the buildup of inoculum in the soil. Crop rotation can slow pathogen population growth somewhat once it has been introduced into a field, but because microsclerotia of *Verticillium* spp. are so long-lived, even long rotations away from susceptible hosts are unlikely to be 100% effective
- **Use resistant or tolerant varieties.** There are no resistant eggplant varieties, but some varieties, including Epic, Long Purple, Rosa Bianca, Casper, and Classic may maintain high yields despite infection. Many tomato varieties are listed by seed companies as having resistance to verticillium wilt.
- Start with pathogen-free planting stock.
- **Soil fumigation and solarization** can effectively kill *Verticillium* inoculum. See the New England Vegetable Management Guide for more information on soil fumigants. Biofumigation involves the incorporation of plants with high glucosinolate compounds into the soil to control soil-borne pathogens. See this 2015 issue of Vegetable Notes and this Biofumigation page from Cornell Extension on using mustard plants as biofumigants. Here is a useful guide on soil solarization for disease, nematode, and weed control from UC Davis: http://vric.ucdavis.edu/pdf/soil_solarization.pdf

--Written by Bess Dicklow and Genevieve Higgins, UMass Extension, with contributions from Meg McGrath, Cornell Extension

SHORT-TERM SUMMER COVER CROPS

We've had a wet and stormy summer so far, and extreme rainfall events can cause significant erosion in bare soils. Bare soil also leaves room for weeds going to seed. Shade produced by a thick cover crop in the summer can keep weed seedheads from forming. There are several good legume and non-legume cover crop choices for planting now and through July that grow rapidly in the summer heat. When planting mixtures in the summer, select equally vigorous crops (similar height and growth rate) so they will not compete and shade each other out. For example, Jean-Paul Cortens, a New York farmer, likes a mix of 50 lbs/A sunn hemp, 10 lbs/A japanese millet, 5 lbs/A sunflower, and 50 lbs/A cowpea or field pea.

Legumes

Cowpea (*Vigna unguiculata*), also known as black-eyed or southern pea, is fast-growing with peak biomass often reached in 60 days. It also tolerates drought and heat. Cowpeas can fix up to 100 lbs N/A with biomass of 3000-4000 lbs/A. It breaks down rapidly after incorporation. Cowpeas also can be harvested in the immature pod stage as a fresh legume. *Drill at 40-50 lbs/A and broadcast at 70-100 lbs/A*.

Sunn Hemp (*Crotalaria juncea*): This tropical legume (not related to other hemps) has great potential in our humid, tropic-feeling summers. Sunn hemp can produce very high amounts of biomass (3-4 tons/A in MA). It is a high nitrogen-fixing legume and can contribute over 100 lbs

A field of sunn hemp in Florida. Photo: T. Jones

N/A to a following crop. Sunn hemp grows very fast in the summer, reaching 6 feet or taller in 8 weeks. Allow sunn hemp to grow 1-3 feet tall, then mow it and let it regrow. If allowed to get too tall, the stems will become tough and fibrous and will not decompose rapidly. This crop is an excellent companion for sorghum sudangrass, which can also be mowed to keep it from getting too fibrous. Sunn hemp is a day length-sensitive crop; it will grow anytime during the summer, however it will not flower and go to seed until the days start getting shorter in very late summer. Seed is mostly sourced from Hawaii at this point and may be expensive, but the N contributions may be worth it! *Drill 20-30 lbs/A*.

Crimson Clover (*Trifolium incarnatum*) is a beautiful cover crop that is a great choice for a short-term summer cover or perhaps seeded between plastic rows to reduce splash and erosion and suppress weeds. It is not typically considered an overwintering cover crop in Massachusetts, but in a cover crop research trial conducted by the UMass Extension Vegetable Program in 2016, it overwintered well on four MA farms. It is fairly resilient and tolerates well-drained soils, heat, drought, and low fertility soils. Shade tolerance makes this cover crop a good choice for mixes. Depending on coverage, it can fix 70-150 lbs N/A. *Drill 10-20 lbs/A, and broadcast at 12-24 lbs/A*.

Non Legumes

Sorghum Sudangrass (*Sorghum bicolor x S. sudanense*) Sorghum sudangrass is a cross between grain sorghum and sudangrass. It is a warm-season annual grass that grows well in hot conditions and produces a large amount of biomass. Its thick root system and high biomass makes it useful for soil building. Sorghum sudangrass can reach 6-12 feet tall, but should be mowed when it reaches 2-3 feet tall to prevent it from becoming fibrous and difficult to manage. Mowing also encourages root growth. Unmowed sorghum sudangrass will winterkill but the tough residue can be difficult to manage in the spring. Brown midrib types will decompose more quickly because they have less lignin. Expect 3-4 tons of biomass addition per acre in MA. Because it is a grass, to get the most growth you will need to add nitrogen fertilizer (40-80 lbs/A), which will be cycled on to the next crop. Sorghum sudangrass is very effective at suppressing weeds and has been shown to have allelopathic and biofumigant properties useful for nematode management. *Drill 35-40 lbs/A or 40-50 lbs/A broadcast.*

Phacelia (*Phacelia tanacetifolia*), also known as blue or purple tansy, is a good cover crop for use in rotation on vegetable farms because it is in a different plant family than most vegetable crops. This fast-growing cover crop is best to seed in mid-summer. While it does not have a deep taproot, phacelia is a wonderful soil aggregator in the top 2 inches. Beneficial insects including parasitoids, bees, and pollinators are attracted by the fuzzy blue/purple flowers. This cover crop will winterkill at 15°F. *Seed at 1lb/A drilled and 3 lb/A broadcast.*

Forage-Type Pearl Millet (*Pennisetum glaucum*) or **Japanese Millet** (*Echinochloa* spp.) have similar functions as a summer cover crops: they grow rapidly but are easier to manage than sorghum sudangrass. They also produce less biomass than sorghum sudangrass. Both millets grow about 4-6 feet tall and have similar seeding rates. They are well-adapted to sandy and/or infertile soils and do well in the summer heat. Forage types are better adapted for soil improvement than grain types. To get the most growth, you will need to add nitrogen fertilizer (40-80 lbs/A). Pearl millet has been shown to suppress some nematodes. Forage pearl millet can make a good mulch for late-summer plantings of no-till or strip-till crops. *Seed at 12-15 lbs/A drilled or 15-20 lbs/A broadcast*.

Buckwheat (*Fagopyrum esculentum*): If weed suppression is your main goal, buckwheat is a good choice. It can be sown as early as May 20, but will put on more growth if seeded in June. As a broadleaf plant, it covers the ground earlier than grass cover crops, and out-competes weeds. A good stand of buckwheat attracts beneficial insects, improves soil tilth, and produces more biomass than any other cover crop in the short time it grows, but doesn't do well if the plow layer is compacted. It scavenges phosphorus from soil and makes it available to subsequent crops. Buckwheat does well even in low nitrogen or low phosphorous soils, without additional fertilizer. Buckwheat decomposes quickly after incorporation. Mow or incorporate when the planting begins flowering to avoid seed production and volunteers. *Drill at 50 lbs/A or broadcast at 70 lbs/A.*

A field of buckwheat.

Additional Information

- Summer Soil Improving Crops for Vegetable Rotations, Gordon Johnson, Extension Vegetable and Fruit Specialist, University of Delaware.
- Cover Crop Guide for New York Vegetable Growers. From Cornell Cooperative Extension. This site includes cover crop profiles as well as a cover crop decision tool, where you can get crop recommendations based on your management goal, planting time, and cover crop duration.
- Cover Crops: What a Difference a Few Weeks Makes! Results from Cornell Organic Cropping Systems Trials.
- Cover Crop Periodic Table

--UMass Extension Vegetable Program

Caterpillars in Brassica Crops

We're now seeing extensive damage from imported cabbageworm and diamondback moth in brassicas across the state. Though they may all look alike, the four major brassica caterpillar pests are different species and there are important distinctions among them that can affect your management decisions. They differ in size and feeding habits, as well as how susceptible they are to beneficial parasitoid insect species and certain insecticides. Getting acquainted with these pests will help you to know what kind of damage to expect and what to look for when scouting for their different life stages and biocontrols. Feeding damage by any of these caterpillars can reduce yield and marketability of both leafy and heading crops.

Clockwise from top left: Imported cabbageworm egg, larva and pupa (Photos: UMass Veg Program) and adult (Photo: M.C. Legg, Bugwood.org)

Imported cabbageworm or **cabbage butterfly** (*Pieris rapae*) is a very familiar white butterfly that can be seen during the day fluttering around brassica fields. Each forewing has a dark border and one or two round black spots. Eggs are laid singly on the underside of leaves, standing upright. They are bullet-shaped, about 1/8 inch in length, and initially pale white, but turning to yellow as they mature. Larvae are gray-green, slightly fuzzy, and sluggish but can be very well camouflaged. Feeding and resting occur on the underside of leaves, and larvae feed more heavily in the head of cabbage or broccoli as they develop. The overwintering stage is the crysalis (pupa), which is green or brown, smooth with three pointed ridges on its back. There are 3-4 generations per year.

Clockwise from above: Diamondback moth pupa, adult (Photo: L. Buss), and larva with characteristic window-pane feeding damage.

Diamondback moth (*Plutella xylostella*) adults are tiny (<1/2 inch long), light brown, and rest with their wings folded together like a tent. Historically DBM did not overwinter in the Northeast, but caterpillars have been reported by May in recent years, suggesting that they may be overwintering in high tunnels or other warm spots. This pest also blows in every year from warmer areas to our south. Adults are weak fliers, but populations are known to disperse long distances on wind and annually reinvade areas well into Canada. Eggs are laid singly or in small clusters. Caterpillars go through four instars and are small (<1/2 inch when fully grown), light green, and appear segmented, with a forked end and pointed shape. When disturbed they wiggle vigorously and may drop off the plant on a string of silk. Feeding causes small, round holes that don't break through the top layer of leaf tissue, leaving translucent films across holes (see photo at left). Feeding tends to be

spread across the foliage and not necessarily concentrated in the head.

Cabbage looper *(Trichoplusia ni)* usually does not survive the winter in New England and arrives in migratory flights from farther south. Generally, populations of cabbage loopers are not high until late July or August, though some years they are not found at all or earlier flights occur. Adult moths are mottled gray-brown, about 3/4 inch long, with a distinct round silver-white mark on each forewing. Since they fly at night, they are rarely seen unless monitored with pheromone traps. If you want to know when moths arrive, use a wing trap baited with *Trichoplusia ni* lure, placed near the canopy. Eggs are round, pale green or yellow, and are laid singly underneath the foliage. The cabbage looper caterpillar is light green, smooth, with wavy white or light yellow lines down the back and sides, and prolegs at the tip of the abdomen. Full-grown larvae reach 1½ to 2 inches. Cabbage loopers of any size move like inchworms—by raising the middle of their body in a characteristic "loop" shape. Feeding tends to create large, ragged holes in foliage, on both frame leaves and heads. Cabbage looper also feeds in many non-brassicas including lettuce, celery, spinach, and chard, so when they do arrive, scout those crops as well as brassicas.

Cabbage looper larva (left) and egg (right). Photos: J. Boucher and W. Cranshaw, Colorado State Univ., Bugwood.org

Cross-striped cabbageworm (*Evergestis rimosalis*): Formerly restricted to the South, this insect is now a serious problem on brassica crops in southeastern New England. One of the major differences between this insect and the other brassica caterpillars is that the eggs are laid in a group, and caterpillars feed in a group on one plant so that it's covered with big holes like buckshot. CSCW is closely related to European corn borer, and the adults are similar in shape and coloring–straw-colored with a little purple, and crossed by wavy lines. Since the adults fly at night, you will likely only notice the caterpillars and their damage. The clusters of 3 to 25 eggs are yellow, flattened, and attached to the lower leaf surfaces. The caterpillars are light bluish-grey on top and green underneath, with numerous black transverse bands across their backs and a yellow line down each side. Larvae grow to ¾ inch long in 2 to 3 weeks. There are 2 to 3 generations per year, but generally, numbers do not reach damaging levels until late summer. Larvae can produce small holes in leaves until only veins remain, feed in terminal buds and sprouts, or burrow into heads. Plants with larvae are often completely skeletonized. Adjacent plants may be left undamaged.

Cross-striped cabbagworm larva. Photo: T. Kuhar

Field Scouting and Management. It is especially important to check cabbage or broccoli plantings as they begin forming heads. Greens such as collards and kale should be scouted earlier, since all leaves are marketed. Randomly select 25 plants throughout the field and check for caterpillars or fresh feeding damage on the top or underside of leaves. Feeding damage can be found on the underside of leaves or in the center of the plant where heads are forming. Look for black or green frass and tiny feeding holes, clustered together. Often it is easier to spot the frass and feeding damage first, then find the caterpillar. Classify plants as infested (one or more caterpillars present) or non-infested, and calculate the percent of plants infested. In the Northeast, there is generally no need to treat young plants unless weather conditions delay plant development and at least 35% of them are infested with any of these pests. Treat heading crops between the start of heading and harvest if 15-20% or more of the plants are infested. The most critical time to scout and apply controls is just prior to head formation. For leafy crops like kale and collards where all leaves are marketed, a 10-15% threshold should be used. Because cross-striped cabbageworm can be so destructive, a lower threshold should be used—treat when 5% of plants are infested with this pest.

Insecticide applications. Use selective insecticides to protect beneficial insects that keep aphids under control, eat insect eggs and small caterpillars, and parasitize either ICW or DBM. Selective products often are most effective when consumed with foliage, so coverage is important. Use at least 50 gal spray material per acre; higher volumes provide better coverage. Better coverage of lower leaf surfaces can also be achieved by using drop nozzles. Use a spreader-sticker to prevent sprays from rolling off of waxy leaves. The most effective materials include:

Diamides (Group 28) including chlorantraniliprole (e.g. Coragen)

Spinosyns (Group 5) including spinetoram (Radiant) and spinosad (Entrust) - *also effective against flea beetles and onion thrips*

Bacillus thuringiensis (Group 11) including *Bt aizawi* (XenTari) and *Bt kurstaki* (such as Dipel DF and many other products) – *these materials are highly selective and will* ONLY *affect caterpillars*

These materials and the *aizawai* strain of *Bt* will usually provide better control of resistant DBM than older products. See the cabbage/insect control section of the New England Vegetable Management Guide for additional synthetic and naturally derived products and more details.

A pupa of Cotesia rubecula*, a parasitoid of imported cabbageworm. Photo: R. Van Driesche*

Cultural and biological controls. Incorporate crop residues shortly after harvest to reduce movement to successive plantings and reduce overwintering populations. Populations are suppressed by a wide range of natural enemies, including several species of parasitic wasps. DBM eggs are parasitized by the ichneumonid wasp, *Diadegma insulare*, which occurs naturally in eastern North America. *D. insulare* females require sources of nectar, so maintain wildflower stands near brassica fields. ICW eggs are parasitized the braconid wasp, *Cotesia rubecula*, which was introduced to New England from China in 1988, and is now established in Massachusetts. You may see their small white cocoons on brassica leaves. The chalcid wasp, *Trichogramma brassicae*, will lay its eggs in many species of caterpillar, including all of the brassica pests above (as well as non-target caterpillars, so be cautious if you *are* maintaining wildflowers that might attract endangered moths or butterflies). These wasps are not found in New England, but can be purchased from several biological control companies for release in brassica fields. The wasps arrive as pre-parasitized caterpillar eggs that are glued to cards that can be distributed throughout the crop. Each card costs around $16-$20, and contains about 100,000 wasps, which is enough for up to 1 acre. According to one source of *T. brassicae* wasps, IPM Labs Inc., some growers will release the wasps in lieu of using any kind of pesticide. Some growers release one card per acre per week for about 4 weeks, while others will release every week for the life of the crop. These biological controls are compatible with many selective and lower impact sprays used for control of caterpillars (*Bt*, oils, soaps), especially because the wasps are protected from sprays when they are inside of host eggs. Another source, Evergreen Growers Supply, notes that *Trichogramma* wasps are more effective against moth species that lay their eggs in clusters, so may be a good option if cross-striped cabbage worm has been a particular problem on your farm.

--Written by R. Hazzard, S.B. Scheufele, and L. McKeag

News

Let us know how you use the New England Vegetable Management Guide!

Do you use the New England Vegetable Management Guide as a resource? If so, we want to hear from you!

The authors of the New England Vegetable Management Guide want to learn more about how the guide is used, so that we can make it as useful as possible. While we are revising the guide, we have designed a short survey to better understand what YOU value in the guide. Please consider taking 5 minutes to provide your feedback and suggestions here: https://unh.az1.qualtrics.com/jfe/form/SV_9Ag68WJ1uyjreE6.

APR Program Accepting Applications - Application Deadline Extended to July 23

MDAR is currently accepting applications for the Agricultural Preservation Restriction (APR) Program. The Program purchases the non-agricultural value of the farmland in exchange for a permanent deed restriction which prevents uses and activities that may impact the present or future agricultural use and viability of the property.

Through purchases of Agricultural Preservation Restrictions, the APR Program preserves and protects agricultural land, including designated farmland soils, which are a finite natural resource, from being built upon for non- agricultural purposes or used for any activity detrimental to agriculture. It is a voluntary program which offers a non-development alternative to farmers and other owners of "prime" and "state important" agricultural land who are faced with a decision regarding future use and disposition of their farms. To date, the program has protected over 930 farm properties

across the Commonwealth.

Applications will be considered for funding through the APR Program and the federal USDA Agricultural Lands Easement (ALE) Program. The program accepts applications on a rolling basis. In order to be considered a priority for the next funding cycle **submit an application no later than July 23rd deadline.**

Applications must be received by 4:00 P.M. on July 23, 2021. Applications may be mailed, hand-delivered or sent electronically. Those sent by fax will NOT be accepted, and postmarks will NOT be considered.

To learn more about the APR program and for program eligibility go online to APR Program Details.

MDAR Seeks Responses for the Specialty Crop Block Grant Program – Round II

The purpose of the Specialty Crop Block Grant Program (SCBGP) is to enhance the competitiveness of specialty crops. Specialty crops are defined as "fruits, vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture)." Additional specialty crop categories and details here.

For details and how to apply, click here - **Applications are due by Tuesday, August 10, 2021 at 5:00pm.**

An informational webinar where questions may be asked will be held for interested applicants. **Please contact Rebecca Davidson at Rebecca.Davidson@mass.gov to request access to the webinar: Tuesday, July 20th, 2021 at 9:30am.** Note, webinar will be recorded.

Events

In-Person UMass Summer Field Day

When: Tuesday, July 27, 2021, 3-7pm. Dinner at 7pm (Rain date: Thursday July 29)

Where: UMass Crop & Livestock Research & Education Farm, 91 River Rd, South Deerfield, MA

Registration: Free! Pre-registration required. Click here to register for this event.

Come to see the newly purchased no-till transplanter in action. Also, learn about several new innovative research projects on a wide range of topics including soil health, cover crop termination strategies, summer and fall cover crop mixtures, vegetables, forages, and more. The field day includes a four-hour tour by the Vegetable and Crops, Dairy, Livestock extension teams. Dinner will be provided at the end of the tours. More details about the projects, researchers, and tours will be available in early July.

This event will be made possible by UMass Center for Agriculture, Food, and the Environment, MDAR, Northeast SARE, the UMass Stockbridge School of Agriculture, and American Farmland Trust.

UNH North Country Lunch and Learn

UNH Extension is offering this online series, open to all but focused on growing vegetables commercially. So, grab your lunch and let's learn!

This event is free, but registration is required.

- **August 4, 12-1pm:** Brussels Sprouts: Growing and Storage

Registration: Click here to register for these workshops.

Questions? Contact nicholas.rowley@unh.edu or heather.bryant@unh.edu or call 603-788-4961 ext. 207

Successful Food Product Development for New Food Businesses: Managing Quality & Safety

Are you an entrepreneur developing new and exciting products? Do you have questions about ensuring the safety of your product? If so, this is the program for you! This course is a program designed specifically to address product development and food safety issues faced by small processors. Throughout the course, we will introduce the food science basics, important considerations when developing a new food product, share key elements required for product labeling, and provide an overview of key regulatory requirements for small and emerging food businesses, such as entrepreneurs and local food processors.

This is an online course that takes place over **6 sessions on Monday evenings in July and August.** This program is sponsored by a USDA-NIFA grant and there is no fee to participate.

For course details and registration information click here.

THANK YOU TO OUR 2021 SPONSORS!

Become a sponsor!

Vegetable Notes. Genevieve Higgins, Lisa McKeag, Susan Scheufele, Hannah Whitehead co-editors. All photos in this publication are credited to the UMass Extension Vegetable Program unless otherwise noted.

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