UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

A cover crop planted between leek beds has helped Blossoming Acres farm in Southwick manage both weeds and excess water. A weed whacker helps manage the cover crop. Photo: L. McKeag

Crop conditions

It's wet out there. Most parts of the state received huge amounts of rain over the last two weeks, with many locations logging 6.5-8.5 inches of rain since July 1, which is twice the 30-year average rainfall for the entire month of July. Growers are struggling to get into fields to harvest as fruiting summer crops like tomatoes, eggplants, and peppers start to come on. The forecast is looking dryer, with some sunny days ahead finally.

Garlic harvest time is upon us, and many growers are wondering when is the best time to harvest amidst the rain and mud. If your garlic crop is healthy, it should be able to hold for a week while soils dry out—the crop won't become infected with new diseases in that short a time. If you already had diseases in your crop, the rain likely made it worse, unfortunately. If garlic becomes over-mature, the bulb will burst open from the top and cloves will separate from each other and from the stem, but this also shouldn't happen within the span of a week. If you are harvesting in muddy soils and having trouble with mud clinging to the bulbs and roots, you can consider gently spraying the roots with a hose. Don't submerge bulbs in water or run them through any washing equipment as you could cause physical damage and introduce bacteria. This isn't something we'd recommend in a normal year, but may be better than trying to cure bulbs surrounded by inches of hardened mud!

If you've got plans for making value-added products with any of your harvests, you might be interested in UMass Extension's series of product development workshops. See the events section of this issue for more details!

Pest alerts

Alliums

Keep an eye out for diseased garlic bulbs while you are harvesting. Symptoms and signs of various garlic bulb rot diseases may include stem tissue sloughing off when you pull the garlic, collapsed root tissue, basal plate decay, pink discoloration on the exterior of the bulb, or hard, black fungal sclerotia. See our Culling Garlic: Don't Store or Plant Infected Bulbs article for more details and photos of different diseases.

Brassicas

Cabbage loopers are being seen now in brassica crops. Cabbage looper does not overwinter in New England but is blown northward on storm fronts from southern overwintering sites every year; it therefore shows up later in the season than imported cabbageworm which does overwinter here. *Bt* products are effective and selective for caterpillar pests, protecting beneficial insects in the field. Conventional products include spinosads (e.g. Radiant), pyrethroids (e.g. Brigade, Asana, Declare, Warrior, Mustang), neonicotinoids (e.g. Assail) and diamides (e.g. Exirel, Verimark). Diamide products are more expensive but are systemic, have long residuals, and will also protect against flea beetles, cabbage root maggot, and cabbage aphid.

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.

Cucurbits

Angular leaf spot on zucchini. Spots will expand until they are trapped by leaf veins. Photo S.B. Scheufele

Table 1. Squash Vine Borer trap captures, week ending July 14, 2021

Location	SVB
Deerfield	3
North Easton	6
Westhampton	6
Whately	1
Sharon	16
Leominster	10

Angular leaf spot in cucurbits was reported at two locations this week in MA. Angular leaf spot is caused by the bacterium *Pseudomonas syringae* pv. *lachrymans* and it is usually the first leaf spot disease of cucurbits to show up, as it is seed-borne. Bacteria are spread within the field by splashing water and equipment and people moving through the field. Foliar applications of copper and/or mancozeb may provide some control of angular leaf spot if applied when the disease is first observed.

Downy mildew was reported on cucumber in Saratoga Co., NY and on Long Island this week. The infection on Long Island is suspected to have occurred when Tropical Storm Elsa arrived last week on Thursday or Friday. Last week's storms likely pushed DM inoculum into southern New England as well, so now is the time to be rigorously scouting cucumber and cantaloupe crops for signs of DM. If you are scouting regularly and are confident you will catch DM early on in your field, you may be able to wait to apply targeted DM materials until you see symptoms. If not, begin applying targeted DM materials now. Continue including broad-spectrum fungicides as well. Rotate between targeted fungicide chemistries to prevent resistance development. See the June 17, 2021 issue of Veg Notes for an article on managing cucurbit DM and PM.

Squash vine borer trap counts are lower than last week in most trapping locations, indicating that the first flight is winding down. Untreated fields may be seeing damage at this time. SVB larvae will feed within host stems and exit to pupate in the soil. In warm years, a second generation of adults may emerge in late-summer to mate and lay eggs; the second generation of larvae may feed on winter squash fruit.

Solanaceous

Edema on tomatillo Photo: UNH Extension

Early blight (left) and Septoria leaf spot (right) on tomato. Photos: Clemson Univ., Bugwood.org and G. Higgins

Edema was widely reported on various solanaceous crops across New England this week. Edema is a physiological disorder caused by plants taking up more water than they can use and evaporate out of their leaves. It occurs when soils are waterlogged and/or during long stretches of cloudy weather. In the field during conditions like this, there's not much that could be done to avoid edema. Taking measures to improve soil drainage and avoid waterlogged roots (e.g. avoiding compaction, tile drainage, planting into raised beds, avoiding low spots in the field) may help. See article on waterlogging in this issue.

Late blight has not been reported anywhere in the US so far this year, and there were only a few reports last year. We're not sure why the disease has quieted down, but we're not complaining! While you do not need to be applying fungicides to control late blight, **early blight** and **Septoria leaf spot** are both present and causing damage in the region and require management. There are many labeled materials—see the outdoor tomato disease management section of the New England Vegetable Management Guide for a full list. For organic growers, copper is the most effective

material against fungal and bacterial leaf spots of tomato.

Powdery mildew on tomato
Photo: G. Holmes

False potato beetle larvae.
Photo: A. Gould

Powdery mildew (PM) is starting to show up in high tunnel tomatoes. This is an important disease of high tunnel tomatoes and can significantly reduce yields. The PM pathogen that causes disease on tomato is different from the pathogen that causes the PMs of cucurbits, lettuce, and other crops. Successful control of PM with fungicides requires starting applications before or as soon as the first symptoms appear. Labeled materials include sulfur, copper, chlorothalonil, or mineral oil. Sulfur is the most effective OMRI-listed material. There are some resistant varieties: see this list from Meg McGrath of Cornell Cooperative Extension.

If you have horse nettle on your farm and are wondering why the Colorado potato beetle larvae on the horse nettle are so pale-colored, you might have **false potato beetle** instead! False potato beetle is a different species (*Leptinotarsa juncta*) within the same genus as CPB (*L. decemlineata*) and feeds primarily on horse nettle and other solanaceous weeds, but may feed on solanaceous crops sometimes. False potato beetle larvae have only one row of black spots along the sides of their bodies, compared to CPB larvae which have two rows and are more grey-colored than the reddish CPB larvae

Table 2. Sweetcorn pest trap captures for week ending July 14

Location	GDD (base 50°F)	ECB NY	ECB IA	CEW	CEW Spray Interval
Western MA					
Deerfield	1267	-	0	3	*6 days*
Southwick	1217	1	0	0	*no spray*
Whately	1312	6	0	0	*no spray*
Central MA					
Bolton	1236	1	0	2	*6 days*
Leominster	1218	2	0	2	*6 days*
Northbridge	1123	0	0	0	*no spray*
Spencer	1200	0	0	0	*no spray*
Eastern MA					
Ipswich	1160	0	0	0	*no spray*
Concord	1228	0	0	1	*no spray*
Millis	-	2	0	2	*6 days*
North Easton	1239	0	0	1	*no spray*
Sharon		0	1	2	*6 days*
Seekonk	1380	0	0	0	*no spray*
Swansea		5	0	8	*4 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

Sweet corn

European corn borer (ECB) trap counts are low, similar to last week. We are currently in-between the two flights of ECB, with the second flight starting at 1400 GDD. Current GDDs across the state are 1000-1400 (see Table 2). Scouts in New Hampshire have reported that they are capturing a lot of carrot seed moth in ECB traps, more commonly in the NY strain traps. Carrot seed moths are a similar size to ECB and are white to yellow-white and sometimes have one spot visible in the center of each wing. ECB moths are light-beige to brown and always have a wavy line visible along the middle to bottom of their wings. The tip of the abdomen is visible just beyond the edge of the wings in ECB; the tip of the abdomen is not visible in carrot seed moths.

European corn borer moths (left photo) and carrot seed moth (right photo). Photos: A. Sisson, Iowa State Univ., Bugwood.org and C. Mead

Corn earworm numbers are also similar to last week, with trap counts warranting no spray or a 6-day spray schedule in most trapping locations. Tropical storm Elsa did not appear to bring up a significant wave of CEW moths, as we had been prepared for. If corn earworm trap captures do not warrant a spray (less than 1.4 moths/week/trap captured), spray decisions should be made based on scouting for ECB caterpillar damage.

Fall armyworm damage was found at one farm in Bristol Co., MA this week. Traps at most locations have just gone up this week but low numbers have been captured in other states over the last few weeks. Fall armyworm causes ragged feeding damage and large holes in whorl-stage corn. They will also feed in the developing tassel and ear tips and will bore into the sides of ears. Caterpillars vary in color but have longitudinal striping along their bodies. When viewed head-on, FAW head capsules are divided by an inverted "Y", compared to a solid-colored CEW head capsule.

Fall armyworm damage

Multiple Crops

Phytophthora blight was reported this week in cucurbits and peppers. This soil-borne disease requires wet soils to infect so it's no surprise that we're seeing it show up now. See the article in this issue for more information.

FLOODING, WATERLOGGED SOILS, AND EFFECTS ON VEGETABLE CROPS WITH SPECIAL CONSIDERATION FOR PLASTICULTURE VEGETABLES

--Written by Gordon Johnson, University of Delaware Extension Vegetable & Fruit Specialist, gcjohn@udel.edu.

Editor's note: This article first appeared in the University of Delaware Weekly Crop Update *on May 25, 2018:* https://sites.udel.edu/weeklycropupdate/?p=11873. *The introduction was edited to reflect current conditions in Massachusetts.*

After a prolonged period of dryness to start the season, Massachusetts saw from just a couple inches to over 10 inches of rain in various locations during the first 2 weeks of July. We have seen many fields that have standing water or are otherwise just too wet to get into and we're seeing the effects in the crops that were planted.

Climate scientists predict that extreme weather events will become more common in the Northeast over the next several decades [*see this 2015 report for more information on what Northeast farms can anticipate*]. This will present additional challenges for vegetable growers related to flooding, wet weather diseases, nutrient losses, ability to do timely harvests, field compaction, other wet soil issues, and resulting crop losses.

In flooded soils, the oxygen concentration drops to near zero within 24 hours because water replaces most of the air in the soil pore space. Oxygen diffuses much more slowly in water filled pores than in open pores. Roots need oxygen to respire and have normal cell activity. When any remaining oxygen is used up by the roots in flooded or waterlogged soils, they will cease to function normally. Therefore, mineral nutrient uptake and water uptake are reduced or stopped in flooded conditions (plants will often wilt in flooded conditions because roots have shut down). There is also a buildup of ethylene in flooded soils, the plant hormone that in excess amounts can cause leaf drop and premature senescence.

In general, if flooding or waterlogging lasts for less than 48 hours, most vegetable crops can recover. Longer periods will lead to high amounts of root death and lower chances of recovery.

While there has been limited research on flooding effects on vegetables, the following are some physiological effects that have been documented:

- Oxygen starvation to vegetable roots will cause roots to cease to function resulting in plant collapse with limited recovery potential
- Oxygen starvation in root crops such as potatoes will lead to cell death in tubers and storage roots. This will appear as dark or discolored areas in the tubers or roots. In carrots and other crops where the tap root is harvested, the tap root will often die leading to the formation of unmarketable fibrous roots.
- Ethylene buildup in saturated soil conditions can cause leaf drop, flower drop, fruit drop, or early plant decline in many vegetable crops.
- Leaching and denitrification losses of nitrogen and limited nitrogen uptake in flooded soils will lead to nitrogen deficiencies across most vegetable crops.
- In bean crops, flooding or waterlogging has shown to decrease flower production and increase flower and young fruit

abscission or abortion.

- Lack of root function and movement of water and calcium in the plant can lead to calcium related disorders in plants. There is a potential for higher incidence of blossom end rot in tomatoes, peppers, watermelons, and other susceptible crops when fruits are forming and soils are saturated.

Low lying areas of fields are most affected by excess rainfall. However, cropping practices can also increase water standing. In vegetables, field compaction will reduce water infiltration leading to increased crop losses in wet weather.

Plasticulture Concerns in Wet Weather

In plasticulture, water can accumulate and persist between rows of plastic mulch because of the impervious surface of the mulch. Because much of the rainfall runs off the plastic, water pooling can be serious problem in plastic mulched fields, especially where row middles have become compacted. Vining crops that fruit into the row middles can have vines and fruits sitting in water and this produces ideal conditions for diseases of wet conditions to develop. A prime example is *Phytophthora capsici* (a water mold) that needs saturated soils or standing water to infect plants (fruits).

When water overflows the bed tops of plastic mulched crops, whole beds become saturated as water enters the planting holes. This often leads to plant losses as beds take a very long time to dry once saturated in this way and oxygen is very limited in the root zone.

To avoid water accumulation between plastic mulched beds, tilling with a deep shank or a subsoiler in row middles can help improve drainage. Cut drainage channels at row ends to reduce blockage (dams) that can back up water. Where practical, section plasticulture fields and install cross drains to remove extra water to improve drainage and reduce water damage potential. Growers may also choose not to plant lower areas in the field prone to water damage where plastic is laid.

Compaction between mulched beds can lead to increased ponding.

In some crops such as peppers and strawberries, high raised beds will improve drainage significantly and can reduce losses to water standing between plastic rows. Another option in watermelons (and other strongly vining crops) grown on plastic is to reduce plastic bed width and increase distance between rows to limit impervious surfaces.

In some crops in our region (plasticulture strawberries for example), cover crops such as ryegrass are being grown between beds to reduce erosion. Research on row middle management will be a priority for the future.

When water goes over top of beds they become saturated for long periods leading to plant losses. In this case the water just missed going over the bed (note the trash line).

Identifying Poorly Drained Areas for *Phytophthora capsici* Management

Growers with crops susceptible to *Phytophthora capsici* (P. cap) are encouraged to evaluate fields with susceptible crops (all vine crops, tomatoes, peppers, lima beans) for drainage issues where this disease can proliferate. The primary keys to P. cap management are limiting standing water, the potential for saturated soils, and water movement across the crop.

Recovering from Flooding or Waterlogging

One option to aid in vegetable crop recovery after floods or waterlogging is to aerate the soil by cultivating (in crops that can be cultivated) as soon as you can get back into the field. This allows for oxygen to enter the soil more rapidly. To address nitrogen leaching and denitrification losses, sidedress with 40-50 lbs of N where possible depending on the crop and crop stage.

In vegetable fields that remain wet, consider foliar applications of nutrients. Since nitrogen is the key nutrient to supply, spraying with urea ammonium nitrate (28 % N solution) alone can be helpful. These can be sprayed by aerial or ground application. Use 5 to 20 gallons of water per acre. The higher gallons per acre generally provide

better coverage. As with all foliar applications, keep total salt concentrations to less than 3% solutions to avoid foliage burn.

Future Considerations

To address excess water challenges in the future, vegetable growers will need to invest in and plan for drainage in every field. Solutions including land levelling, surface drainage, tiles (tile wells, patterned tiling), and pumping may all need to be considered. See the article by James Adkins in this issue on drainage basics.

Row middles with ponding due to a field depression.

MANAGING PHYTOPHTHORA BLIGHT

With the weeks of constant rain, soils are saturated and some fields are experiencing flooding—perfect environmental conditions for the soil-dwelling oomycete (a fungal-like type of organism) *Phytophthora capsici*, which causes significant disease in cucurbits and pepper. If you have susceptible crops planted into fields infested with *P. capsici*, you're likely to see disease begin to develop now. *P. capsici* can also causes disease in tomato, eggplant, beans, and some weeds (e.g. purslane, eastern black nightshade, and Carolina geranium). Warm, wet conditions with frequent rainstorms, like the recent weather, favor disease development. Symptoms vary by crop and may be easily confused with other diseases like bacterial wilt or issues such as water-logging. Be on the lookout for the symptoms described below and submit suspect plants or fruit to the diagnostic lab in order to get a proper ID. This will prevent you from moving the pathogen around your farm and from planting susceptible crops in infested fields in future years. There is also a lot you can do now to manage the disease on your farm.

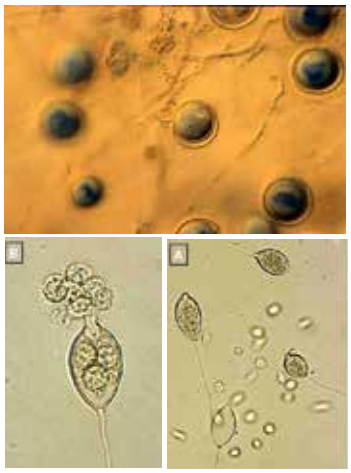
Phytophthora fruit rot on pumpkin, with white sporulation beginning to form. Photo: M.T. McGrath

Symptoms. Many of you are probably all too familiar with the symptoms of Phytophthora blight on cucurbit fruit. Symptoms on other vegetable crops can be quite different from those on cucurbits. On squash fruit, *P. capsici* causes firm, round, water-soaked lesions that develop white mycelial growth that resembles powdered sugar under warm, moist conditions. Cucurbit plants, especially non-vining varieties, can also develop crown rot where whole plants or vines wilt suddenly and eventually the whole plant collapses. Symptoms on pepper are distinctly different, as plants become infected with *P. capsici* via their roots and develop a crown rot that causes darkening of roots and stems and permanent wilt of foliage, while stems remain rigid. Pepper fruit remains attached to the upright stems but may eventually develop dark, water-soaked lesions that can spread to the whole fruit, giving it a soft, wrinkled appearance. On tomato, *P. capsici* causes 'buckeye rot' on fruit where it comes in contact with the ground. Small brown spots on fruit grow into large, round or oblong lesions with alternating rings of light- and dark-brown discoloration. The lesions are firm, with smooth

Collapsing and dead plants, killed by Phytophthora capsici.

Phytophthora crown rot beginning in pepper. Photo: LI Horticultural Research & Extension Center

margins but eventually become soft. Phytophthora blight has been confirmed more recently on lima and snap beans in the field and on soybean under lab conditions. These crops had previously been considered non-hosts. Bean pods develop water-soaked lesions that develop diffuse, white sporulation. Bean stems and crowns can also be affected; plant collapse in low-lying areas of fields is common.



Above: Oospores of P. capsici. *Photo: M. Babadoost. Below:* P. capsici *sporangium releasing mitle zoospores (left) and sporangia with zoospores (right). Photo: M. Babadoost*

Disease Cycle. *P. capsici* persists in soil for many years as thick-walled resting spores called oospores. These long-lived oospores can be spread throughout the field during tillage or cultivation, and they can be spread between fields or farms on infested soil clinging to tractor or truck tires, harvest buckets, workers' boots, or discarded infected fruits. During wet conditions, oospores germinate and produce asexual, short-lived sporangia that contain 20-40 zoospores. Zoospores are motile spores that swim towards host roots or fruit and infect. The resulting lesion will then produce more sporangia and zoospores that can be spread by surface water, rain, or splashing water. One infected spaghetti squash is estimated to produce 44 million sporangia with the potential to release 840 million zoospores. This accounts for the rapid, above-ground spread of disease within a field or a season. Outbreaks often start in low-lying or poorly drained areas of fields, where oospores are triggered to germinate and swimming zoospores are able to find hosts. Waterlogging alone can also cause stunting and plant death, but if a field is infested with *P. capsici*, the pathogen may be the real cause. Importantly, water run-off from an infested field may contaminate surface water sources used for irrigation. This has been well-documented in irrigation ponds and rivers in NY and MI.

Cultural control: These practices can be effective in helping to prevent outbreaks and manage *P. capsici* once it is present. Cultural controls will likely not be enough to completely avoid the disease if planting susceptible crops into infested soil, but can be used in combination with fungicide applications to minimize damage.

Minimize standing water. Plant cucurbits in well-drained soils, and minimize hardpans and plowpans by subsoiling or chisel plowing before planting. Do not plant in areas with poor drainage, and avoid over-irrigating. You can plant bush-type cucurbits in raised beds covered with plastic mulch, though this method is less effective with vine-type plants, since they will grow beyond the beds. More details about this can be found in this Cornell Cooperative Extension Fact Sheet from Meg McGrath.

Crop rotation: A minimum crop rotation of 3-4 years is recommended, although fields that have been out of susceptible crops for >5 years have had outbreaks in recent years. Planting non-hosts into infested fields for any number of years is useful—each year an infested field is planted with a non-host, the number of surviving oospores will be reduced. The host range of *P. capsici* is broad but the list of non-hosts includes brassicas, carrots, onions, and small grains. Tolerant pepper varieties are available if crop rotation is impossible. Similarly, pumpkin varieties with hard shells, such as 'Lil Ironsides' or 'Apprentice' have been shown to be significantly less susceptible to disease than similar varieties with conventional, soft rinds.

Cover crops can be used to help mitigate the effects of *P. capsici*, as the addition of soil organic matter stimulates beneficial microbes. A healthy soil microbial community can reduce plant pathogen activity by outcompeting them for space and nutrients, by direct parasitism of plant pathogens, by producing antibiotic compounds that slow pathogen growth, and by stimulating the plants' natural defense systems.

Biofumigation: Research has shown that brassica cover crops (especially mustards) release glucosinolates and other compounds as they break down that are toxic to microorganisms, including plant pathogens. Plant pathogens are not always great soil competitors, so this "biofumigation" allows beneficial microorganisms to repopulate the soil. In order to get the highest release of glucosinolates, the brassica cover crop should be fertilized. At termination, incorporate the brassica residues by chopping and rototilling, followed by cultipacking and irrigating just before the crop is planted. Allelopathy can be a concern for some sensitive crops when using this system. For more detailed info check out this factsheet from Cornell University.

In-season management steps. Plan on harvesting from clean fields before you go into infested fields with tractors, trucks, workers, and bins. Take time to wash equipment when moving between fields to remove soil or crop residues that may

contain sporangia or oospores. Ideally, do not leave infected fruit in fields or in cull piles. If a *P. capsici* infection is isolated and caught early, removing the infected plant material from the field and harrowing a border of healthy, unaffected plants around the area can prevent the disease from spreading. If the infested area is large and plant material cannot be removed from the field, make sure to till it under deeply. Remember that there is a 2-6 day lag period between infection and symptom expression so if you suspect *P. capsici* is present, hold fruit for a few days before sending large wholesale shipments out to avoid their being returned due to rot.

Chemical control. Fungicides can be used effectively and economically to reduce the impact of disease on yield, though none will provide sufficient protection to be used as the sole management strategy—they must be part of an integrated program including cultural controls. For many row crops, applying fungicides through trickle irrigation (if allowed by product label) can help control crown rot. In vining crops, foliar applications will also be needed later to protect developing fruit, which may be resting on infested soil. Foliar applications can be difficult to make because of dense canopy. Air-assisted nozzles may help improve coverage. *P. capsici* has the ability to develop resistance to targeted fungicides, so resistance management strategies like mixing targeted fungicides with protectant fungicides and rotating modes of action with every application, are extremely important. Some populations of *P. capsici* have become resistant to Ridomil (mefenoxam), which has been used extensively in the past to drench plants in the early season. Thus, Ridomil may no longer be effective in fields where it has been used repeatedly. Instead, you can treat transplants or seedlings with a drench treatment of a phosphorous acid fungicide such as ProPhyt, K-phite or Fosphite, which have been shown to be effective as soil or foliar applications. Other effective, targeted materials include:

Orondis: Oxathiapiprolin is a **newer active ingredient** which has demonstrated **excellent efficacy** against oomycete pathogens including *P. capsici*. Two formulations are labeled for Phytophthora blight: Orondis Gold 200 and Orondis Ultra. Orondis Opti is not labeled for Phytophthora blight.

Orondis Gold 200 (oxathiapiprolin): *FRAC 49, PHI 0d, REI 4 hrs.*
At-planting soil applications only for Phytophthora blight. Foliar applications of other FRAC-49 containing products is prohibited after soil applications.

Orondis Ultra (oxathiapiprolin + mandipropamid): *FRAC 49+40, PHI 0d, REI 4 hrs.* Also labeled for cucurbit downy mildew. Make no more than 2 consecutive applications. See label for further restrictions.

Ranman *FRAC 21, PHI 0d and REI 12hrs.*
Can be used beginning before symptoms occur for a maximum of 6 applications.

Omega FRAC 29, *PHI 7 days (squash, cucumber), 30 days (melon, pepper) REI 12 hrs.*
Apply no more than 7.5 pts/A to a crop or 4 applications if applied at highest label rate of 1.5 pts/A. Omega is more expensive than other fungicides.

Forum *FRAC 40, PHI 0d, REI 12 hrs.*
Can be used on all cucurbit crops at 6 oz/A every 5 to 10 days, depending on disease pressure, beginning when plants are 4-6 inches high for a maximum of 30 oz or 5 applications. It must be used in a tank mix with an effective fungicide that has a different mode of action (non-Group 40 fungicide).

Tanos *FRAC 11+27, PHI 3d, REI 12hrs.*
Labeled at 8-10 oz/A for a maximum of 4 applications. Tanos must be tank-mixed with a protectant fungicide like copper, chlorothalonil or mancozeb. Follow a strict alternation with no consecutive applications of Tanos.

Gavel *FRAC 22+M3, PHI 5d, REI 48 hrs.*
Labeled for use at 1.5–2.0 lb/A every 7 to 10 days or when conditions are favorable for disease for a maximum of 8 applications.

Presidio and **Revus** are other materials that would make good choices for managing Phytophthora blight in cucurbit crops. Be aware, though, that while Phytophthora blight and cucurbit downy mildew are both caused by the same type of pathogen and thus are sensitive to similar targeted fungicides, Presidio and Revus are no longer recommended for downy mildew because that pathogen has developed resistance to these materials. These materials do still work for Pytophthora blight and are also labeled for pepper and eggplant.

More detailed information about additional fungicides labeled for control of Phytophthora blight is available in this Cornell Cooperative Extension fact sheet.

For organic growers, there are several soil-applied materials labeled for use in controlling *Phytophthora* species including *P. capsici*, and while they may not work as well as targeted synthetic fungicides, they can reduce disease severity and improve yield. 2013 trials conducted by Dr. Mary Hausbeck at Michigan State University found that BioTam, Serenade Soil, and Actinovate Ag all significantly reduced plant death and increased yield relative to the untreated control. Each product was applied as a soil drench at the base of yellow squash plants grown on black plastic. When she used these biofungicides in rotation with a synthetic fungicide, Presidio, she got even better control, indicating these materials could be used as rotational tools in conventional spray programs. The full report from these trials is available here.

Management of *Phytophthora* begins with prevention. Be aware, informed, and proactive. If infections occur, a program that includes multiple control strategies can reduce the pathogen population size over time.

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

Cabbage aphid

We have been seeing low levels of infestation of cabbage aphids in some brassica fields for at least a month now. This pest has been a significant problem in some years and less so in other years. Infestations can stunt plants and reduce yield but the physical presence of the aphids in Brussels sprouts buds or on leafy greens is often the biggest concern. The best control is achieved by scouting early in the season and treating crops when populations are small and isolated. Cabbage aphids will feed on any brassica crop but Brussels sprouts are particularly hard hit, as aphids have a long time to build up and they get into the buds where they can't be reached by insecticide sprays.

Cabbage aphid colony

Identification. Adults, both winged and wingless, and nymphs are grayish-green with a dark head and short, dark cornicles, but appear more grayish-white because the body is covered with a fine, white, powdery secretion. Dense colonies may develop.

Yellowing caused by cabbage aphids feeding on the underside of the leaf. Photo: B. Sideman

Life cycle. Only crops and weeds in the brassica family are suitable hosts for cabbage aphid. Cabbage, cauliflower, broccoli and Brussels sprouts are most severely affected, but other crops may become infested. Aphids tend to be more of a problem in fall plantings, but this year we saw low levels of infestation in spring plantings. They overwinter as eggs, which are laid on the undersides of leaves of the same crops or weeds that were fed on during the summer. This differs from the life cycle of many aphid pests of vegetables, where eggs are laid and overwinter on alternate hosts outside the field. Eggs typically hatch in April. Nymphs feed and develop into reproductive females who produce live young without mating. Winged adults disperse with wind and infest new crops. There are multiple summer generations and potential for huge population growth, especially where long-season crops (e.g. Brussels sprouts) are infested early.

Damage. Cabbage aphids prefer to feed on young leaves, flower buds, or seed stalks in the upper part of the plant and also feed in developing Brussels sprout buds. Feeding injury includes wrinkled and downward-curling leaves, yellow leaves, and reduced growth. Contamination of marketable parts of the plant with aphids is frequently the biggest problem, as is contamination of the plant with aphid honeydew. (a sugary, sticky secretion produced by the aphids). Cabbage aphids can also transmit cauliflower mosaic and cabbage ring spot virus, among other viruses; transmission is non-persistent, with virus particles passed to new plants by probing.

Toxomerus marginatus *(left), a common species of syrphid fly, whose larvae feed on cabbage aphids (right). Photos: G. Higgins*

Biological control. Natural enemies can suppress cabbage aphid populations, but may not be able to prevent or control high densities

that can occur in cool fall weather. Predators of cabbage aphids include syrphid fly larvae and ladybugs. The tiny ichneumonid wasp, *Diaeretiella rapae*, is a parasitoid of cabbage aphid—female wasps lay eggs within the aphids and the resulting larva consumes the aphid from within, creating a round, bronze-colored "mummy". These natural enemies can be attracted to brassica fields by planting flowers that provide them with nectar and pollen. Research done at both UMass and the University of New Hampshire in 2018-20 found that the flowers of sweet alyssum, dill, cilantro, and *Ammi majus* attracted a high number of syrphid flies and *D. rapae*.

Diaeretiella rapae *laying an egg within a cabbage aphid. Photo: B. Chaubet*

Cultural controls include those listed below. If cabbage aphids are present on your farm, each of these tactics alone will likely not prevent infestation of your crop. If these cultural control practices are implemented along with early, regular crop scouting, outbreaks can be controlled.

- Incorporate crop residues immediately after harvest or, for late-fall brassicas, as early as fields allow the following spring.
- Control brassica weeds in or near fields.
- Check transplants to be sure they are aphid-free. Early-season aphid infestations may originate from greenhouse infestations.
- Use reflective mulch to repel aphids.
- Scout for cabbage aphids weekly beginning in early June. If isolated patches of infested plants are found, removing those plants from the field and destroying them can help avoid their spread.

Chemical control: Use selective products when controlling other brassica pests to conserve beneficial insects, including predators and parasitoids of cabbage aphid (e.g. use *Bt* products to control caterpillar pests). If cabbage aphids are a consistent problem on your farm, systemic insecticides used at planting or sidedress may eliminate early infestations. Scout weekly to determine % infested plants, starting before harvested portions of the plant form. Treat if >10% of the plants are infested with aphids, especially after heads or sprouts begin to form. Or select 10 leaves at 10 sites for 100 leaves per field, and treat if >20% have aphids. Spray coverage of all leaf surfaces, buds, and new growth is key. Include a spreader-sticker to prevent insecticdes from beading up and rolling off of waxy brassica leaves. Waiting until there are heavy outbreaks or until just before harvest makes it hard to prevent loss of marketable yield.

Research from the University of New Hampshire showed that cabbage aphid control using OMRI-listed materials can be achieved but you must spray early, when population levels are still low, and often. Azera (azadirachtin + pyrethrins) and M-Pede (insecticidal soap) used in a tank mix or in rotation has been found to be the most effective organic program for controlling cabbage aphids. Azera is a pre-mix of azadirachtin and pyrethrins; it could be replaced with an azadirachtin product alone (e.g. Azatin O, AzaGuard, Neemix, others) or with a tank mix of azadirachtin and Pyganic. Horticultural oils (e.g. SuffOil-X, JMS Stylet Oil, others) will also function to smother aphids—Dan Gilrein of Cornell Cooperative Extension recommends a solution of 2% horticultural oil + 0.5% M-Pede. All of the above insecticides work by contact, so thorough coverage is essential.

For conventional products, Dan Gilrein writes: "Movento was particularly effective in one cabbage trial at the Long Island Horticultural Research and Extension Center. Fulfill and Beleaf are also highly effective and specific aphid materials – all three have helpful translaminar or systemic activity. Alternatives include Assail and Admire Pro/generic spray. Note that the Bravo Weather Stick label prohibits tank mixing with DiPel, Latron B-1956, or Latron AG-98 and warns about combinations with other pesticides and surfactants unless a test shows the mix is safe. Cabbage aphids affected by treatment may not quickly appear to be dead – check after 2 days to verify efficacy."

-Adapted from the 2016-2017 New England Vegetable Management Guide by the UMass Extension Vegetable Program

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, Northeas-SARE, the UMass Stockbridge School of Agriculture, and American Farmland Trust.

Save the Date! – UMass IPM Twilight Meeting at Appleton Farms

When: Wednesday, August 11 from 4-6 pm

Where: Appleton Farms, 219 County Rd., Ipswich, MA 01938

Come join the UMass Vegetable Team and the crew at Appleton Farm for an in-person field walk. Program details and registration info coming soon!

Successful Value Added Food Product Development: Managing Food Quality and 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.

Upcoming Sessions and Registration link:

- Successful Food Product Development for New Food Businesses: Managing Food Quality & Safety- WVU: Mondays, 5:30-7:30pm, July 12 to August 16
- Successful Food Product Development for New Food Businesses: Managing Food Quality & Safety- FCCDC: Tuesday, August 10 and Thursday, August 12, 9am-4pm
- Successful Food Product Development for New Food Businesses: Managing Food Quality & Safety- NFU and UoA: Tuesday, August 31, Wednesday, September 1, and Thursday, September 2, 10am-2pm

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

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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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