



UMass  
Extension

# Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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## CROP CONDITIONS

Frequent, scattered storms have brought a few tenths of an inch here and there, mostly putting an end to the dusty, dry conditions we were feeling a week or two ago. The smoke clouds have moved west and made way for more rain clouds, with more scattered showers predicted through the weekend—may be a wet Father’s Day and Juneteenth for barbecuing or for PYO strawberry patches.

Despite recent “rains,” mild drought status was declared this week for the western- and eastern-most edges of the state, according to the [Massachusetts drought status map](#). The rest of the state remains in level 0 or normal conditions. Forecast rains may improve the situation in drought-affected areas—the Drought Management Task force will reassess in July.

Early potatoes are flowering, corn is starting to tassel, garlic scapes are emerging, strawberries are starting to come in strong after a slow start, and summer squash and zucchini are rolling in.

The weeds are taking advantage of recent moisture and taking off; now is the time to get on top of weeds before they overtake your crops. We were going to share some notes about the effects of *dry* conditions on weed management, like that weeds that emerge under hot and dry conditions “are likely to have thicker cuticles (e.g., the waxy coating on the surface of the leaf), which can inhibit the absorption of foliar-applied products,” and that “crop injury can result when herbicides are applied under high temperatures,” as noted by Professor of Weed Ecology and Management at Cornell University, Dr. Lynn Sosnoskie in the June 7 Issue of Cornell’s *Veg Edge* newsletter. But with rain in



*A pheromone trap set up to capture squash vine borer in Bristol Co. this week. Photo: S. B. Scheufele*

the forecast, it seems more appropriate to say that, while rain allows herbicides to be activated in the first few inches of soil where weeds are germinating, excess rain can move herbicides deeper into the soil, below the root zone, reducing control. Check the [New England Vegetable Management Guide](#) for postemergence herbicide options for specific crops. Herbicides are typically no longer an option after the weeds are taller than 6”, and better control is achieved if they are between 1 and 3”, so whether you are spraying or cultivating, get in as soon as you can!

## PEST ALERTS

### Brassicas

[Imported cabbageworm](#) (ICW) eggs were seen in brassicas in Worcester Co. this week. ICW are the first of several species of caterpillars that feed on brassicas to emerge in the Northeast. They overwinter as pupae and adults emerge in May to mate and lay eggs. Eggs are laid singly on the undersides or sometimes on the tops) of leaves. Caterpillars

## CONTACT US:

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

are solid green and slightly fuzzy. If eggs are present in your crop, expect to start seeing caterpillars in 3-7 days depending on temperature. Treatment thresholds in heading crops (e.g. broccoli, cauliflower, cabbage) are 20% of plants infested prior to head formation, or 15% after head formation. Use a 15% threshold for leafy brassicas (e.g. kale, collards). Labeled conventional products include spinosyns (e.g. Radiant), pyrethroids (e.g. Fastac, Baythroid XL, Brigade, Asana, Danitol, Declare, Warrior, Pounce, Mustang) diamides (e.g. Vetica, Coragen, Exirel, Verimark), emamectin benzoate (e.g. Proclaim), indoxacarb (e.g. Avaunt), and tolfenpyrad (e.g. Torac). The diamides are more expensive but are systemic and have long residuals and will also protect against flea beetles, cabbage root maggot, and cabbage aphid. Bt products (e.g. Dipel, Xentari) and/or Spinosad (Entrust) are the most effective OMRI-listed materials. Use a spreader-sticker to help materials adhere to waxy brassica leaves.



*Imported cabbageworm egg*

## Cucurbits

**Cucurbit downy mildew** was reported on cucumber in southern NJ this week, about the same time as last year, but earlier than most years. This is the first report of CDM in the Northeast this year. CDM travels in the air and is blown northward on storms from infected fields, usually arriving in MA in early- to mid-August. It can also be transported on infected transplants. CDM can be successfully controlled on conventional farms by using preventative pesticide applications, beginning when there is a risk of disease development in the area. Resistant cucumber varieties are an important tool for later season plantings, especially on organic farms where OMRI-approved fungicides are not very effective. We will let you know here in Pest Alerts when fields in MA are at risk for CDM.

**Squash vine borer:** A single SVB adult was caught in Norfolk Co. this week, signaling the beginning of the first flight of this pest. Squash vine borers lay eggs at the base of thick-stemmed cucurbit plants (summer squash, zucchini, some winter squash), and the larvae bore into the stems. Infested plants wilt suddenly and usually die. SVB distribution is patchy – some farms struggle with it every year, and other farms have never had an issue. Row cover will exclude the moths but need to be in place preventively to protect any young cucurbits, and needs to be removed to allow for pollination. Pheromone traps

Whately	0
Leominster	0
North Easton	0
Sharon	1
Southampton	-

are used to monitor adult emergence and time insecticide sprays. A spray is recommended in bush-type cucurbits if trap counts exceed 5/week and in vining-type cucurbits if trap counts exceed 12/week. Conventional pesticides include Assail or pyrethroids (e.g. Brigade EC, Asana, Warrior, Perm-up/Pounce). Organic growers can use spinosad (Entrust) or *Bt aizawai* strain (e.g. Agree WG). Sprays should be directed to the base of plants.



*Squash vine borer adult. Photo: A. Eaton*

## Nightshades

**Colorado potato beetle** egg hatch is just starting in some parts of the state. Take note of when eggs start to hatch in

your fields, as pesticides are most effective if they target the smallest larvae. 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. Labeled conventional products include pyrethroids, neonicotinoids, novaluron (e.g. Rimon), cyromazine (e.g. Trigard), and diamides (e.g. Verimark, Exirel). OMRI-listed materials include spinosad (e.g. Entrust), azadirachtin, pyrethrin (e.g. Pyganic), and *Beauveria bassiana* (e.g. Mycotrol O, Botanigard), which can be tank-mixed and/or rotated. Of those, Entrust is most effective but can only be used 2x on only 1 generation of CPB per season. See the [potato insect management section of the New England Vegetable Management Guide](#) for information on cultural controls for CPB.



*Colorado potato beetle larvae.*  
Photo: D. Ferro

There have been lots of reports of **damaged tomato, pepper, and eggplant stems** in crops planted into black plastic or landscape fabric. Damage to plants can be direct—when the hot edge of the plastic touches the stem or wind whipping the plants against the edge—but also indirectly. When hot air builds up between the plastic and the soil. If the plastic is loose, its flapping (even under a light wind) creates movement of hot air and funnels it through the plastic holes. This causes stem girdling and transplant desiccation, a problem commonly observed with young transplants. See the article in the [June 1, 2023 issue of Veg Notes](#) for more information on black plastic, and consider switching to white plastic when hot, sunny conditions prevail.

We saw lots of [solanaceous flea beetle](#) damage in early plantings of managu, a highly susceptible crop grown by Kenyan farmers in central MA, this week. These flea beetles feed in all solanaceous crops and weeds, and usually do the most damage to eggplant. Potatoes and tomatoes can usually withstand considerable feeding damage once the plants are well-established. Management practices include clean cultivation, crop rotation, removing weed hosts, using row covers, and applying spot treatments targeting the most susceptible crops (eggplant or managu) along the field edges. Scout to observe beetles and damage. Treatment thresholds are as followed: 2 beetles per plant on newly set transplants; 4 beetles per plant for seedlings 3” to 6” tall; and 8 beetles per plant for plants over 6” tall. Most insecticides registered to control CPB will control FB. Systemics applied to the soil at transplanting may control both flea beetle and Colorado potato beetle; avoid using the same chemical group for both soil and foliar treatments.



*Solanaceous flea beetles on eggplant.*

[Potato leafhopper](#) adults were seen in potato fields this week.

Leafhopper adults and nymphs feed on crop leaves by sucking out plant sap with piercing mouthparts. They also inject a toxin into the plant, causing leaves to cup, turn yellow, and then brown and crispy at the edges, reducing photosynthesis and therefore yield. They will feed on a wide range of vegetable crops, but potatoes, eggplants, and beans are the most severely affected. In potato and eggplant, some materials registered for Colorado potato beetle (CPB) adults will also control leafhopper, including neonicotinoid foliar sprays such as Admire Pro or Assail. These and several other carbamate, synthetic pyrethroid, and organophosphate products are also registered for leafhopper in potato, eggplant, and snap beans. Sivanto (flupyradifurone) is a new product in a novel class of chemistries, the butenolides, that works against sucking pests, including PLH. It is also labeled for CPB control. See the appropriate [crop section of the New England Vegetable Management Guide](#) for full lists of



*Potato leafhopper adult*

labeled materials. For organic growers, PyGanic (pyrethrin) is the most effective material. It is a contact insecticide that breaks down in sunlight, so getting good coverage of undersides of leaves is important and spraying late in the day may provide better control. Adding azadiractin as a tank-mix may improve efficacy.

**Potato Virus Y** (necrotic strain) was confirmed in potatoes in Franklin Co. this week. There are several strains of this virus that cause varying symptoms depending on the crop, plant age, and environmental conditions. The affected plants showed light and dark green mosaic pattern on the leaves. The necrotic strain can also cause dark flecking on leaf veins, and tubers can also be affected: skins may show pink to dark brown raised ringspots that develop into sunken dead ringspots in the tuber flesh. Varieties differ in their susceptibility to leaf and tuber symptoms-- Villeta Rose, Eva, Rio, Grande Russet, and Premier Russet are resistant. The virus is spread by aphids quickly, as they probe and feed on plants. Because of this, spread of the virus is hard to control, since the aphids could be simply traveling through and not established on the crop. Many insecticides effective against aphids cause increased probing, and therefore could actually increase virus spread. However, repellents such as horticultural oils (especially early on when aphid populations are low and plants are young) and newer behavior modifying pesticides--including Assail, Belay, Admire Pro, Fulfill, Movento, Platinum--may be of use. The best management practices are to start with certified seed and, if growing susceptible potato varieties, planting a buffer of sudangrass or other tall cereal around the field so that aphids moving into the field will clean their probing stylets before coming in contact with your crop has been shown to reduce disease incidence.

### Sweet Corn

<b>Table 2. Spray Intervals for Corn Earworm based on moth captures in Heliothis net traps.</b>	
<b>Moths/Night</b>	<b>Spray Interval</b>
0 - 0.2	no spray
0.2 -0.5	6 days
0.5 - 1	5 days
1 - 13	4 days
Over 13	3 days

Early stands of corn are patchy, likely due to the effects of the late-spring frost.

**European corn borer** moths are being caught across the state now, with a high of 14 captured this week in Middlesex Co. Over the last several years, trap captures have routinely underestimated infestations in the field, so be sure to scout corn as it begins to tassel to determine if a spray is necessary. Sprays are warranted if 12% of plants scouted have 1 or more caterpillar. In whorl corn, ECB caterpillars boring into the whorl will result in shot-hole damage in the expanding leaves.

**Corn earworm** was captured in Hampden and Franklin Cos. this week, as well as in some locations in NY and NH. CEW historically has only overwintered

<b>Table 2. Sweetcorn pest trap captures for week ending June 14</b>					
<b>Location</b>	<b>GDD* (base 50°F)</b>	<b>ECB NY</b>	<b>ECB IA</b>	<b>FAW</b>	<b>CEW</b>
<b>Western MA</b>					
Feeding Hills	538	1	0	0	6
Southwick		4	0	0	3
Granby	497	-	-	-	-
Whately	555	1	0	-	1
<b>Central MA</b>					
Lancaster	572	3	0	0	0
Leominster		1	1	0	0
Northbridge	448	-	-	-	-
Worcester	526	-	-	-	-
<b>Eastern MA</b>					
Bolton	515	0	0	-	-
Concord	480	4	0	0	0
Methuen	499	-	-	-	-
Ipswich	439	-	-	-	-
Millis	-	2	0	n/a	-
North Easton	510	0	0	0	0
Sharon		0	0	n/a	0
Sherborn	508	14	0	0	0
Seekonk	483	0	0	0	0
Swansea		4	0	-	-
- 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					

in the South and has been blown northward on storms, arriving in the Northeast in July. There are now overwintering populations in NY, and potentially other parts of the Northeast. We have not previously had CEW traps out this early in MA. This early moth may have blown in from an overwintering site in NY, or may signify an overwintering population here. If CEW trap captures remain below 2/week, pesticide sprays in sweet corn should be based on the results of scouting for caterpillars in the field. As CEW trap captures increase, sprays should be based on trap captures (see Table 3).

## **WILDFIRE SMOKE AND VEGETABLE CROPS**

While the wildfires burning in eastern Canada have been largely controlled and our local air quality has improved, growers may still be wondering what effects the smoke may have had, or may still have, on vegetable crops. And with western Massachusetts having been under a red flag warning just last month, rare for this region and issued when dry conditions and high winds indicate an increased risk of rapid fire spread, we may need to get more accustomed to the impacts from wildfires on Northeast farms. Below are articles by our Extension colleagues, Gordon Johnson, Vegetable & Fruit Specialist for the University of Delaware Cooperative Extension, and Steve Reiners, Professor in Horticulture at Cornell University, with their views.

*--UMass Vegetable Program*

### **WILL SMOKE FROM WILDFIRES AFFECT VEGETABLE CROPS?**

*--Written by Gordon Johnson, Extension Vegetable & Fruit Specialist; [gcjohn@udel.edu](mailto:gcjohn@udel.edu). Originally published in University of Delaware Cooperative Extension Weekly Crop Update, Vol. 31, Issue 11, June 9, 2023. <https://sites.udel.edu/weeklycropupdate/?p=22595>*

I was recently asked if smoke from wildfires will affect vegetable crops. The answer is complex and largely dependent on how long the wildfires continue to burn and weather patterns bring the smoke into our region.

When Emmalea Ernest and I were in eastern Washington State several years ago they had gone through a period where smoke from fires in British Columbia covered the seed growing region of that state for over a month. Researchers commented that crops stopped growing and were delayed in maturing for at least 4 weeks.

This is because smoke limits sunlight reaching crops and thus reduces photosynthesis. In addition, temperatures are reduced, which also slows growth. Deposits of fine particles from smoke on plants can also reduce effective sunlight until washed off by overhead irrigation or heavy rain.

Another consequence of wildfire smoke can be an increase in ozone levels. Ozone is a major cause of air pollution and can damage plants. Certain vegetables are highly susceptible to ozone injury. Those vegetables most susceptible include potatoes, watermelons, cantaloupes, snap beans, pumpkins, and squash.

Ozone injury in susceptible vegetable varieties develops when ozone levels are over 80 ppb for four or five consecutive hours, or 70 ppb for a day or two when vegetable foliage is at a susceptible stage of growth. Ozone levels for Delaware are at 64 ppb, near the critical level for damage. Ozone levels are predicted to be 77 on Saturday, June 10. (DNRC's Air Quality Forecast can be found at: <https://dnrec.alpha.delaware.gov/air/quality/forecast/>)

[Ed note: link for *Massachusetts*: <https://airquality.weather.gov/sectors/massachusetts.php>]

On potatoes, symptoms of ozone damage occur on the most recently emerged leaves and can be seen as a black flecking. Early red varieties are most susceptible.

Injury on watermelon leaves consists of premature chlorosis (yellowing)



*Ozone injury on watermelon. Photo: M.Newark*

on older leaves. Leaves subsequently develop brown or black spots with white patches. Watermelons are generally more susceptible than other cucurbits to ozone damage. Damage is more prevalent when fruits are maturing or when plants are under stress. Injury is seen on crown leaves first and then progresses outward. Seedless watermelon varieties tend to be more resistant to air pollution injury than seeded varieties, so injury often shows up on the pollinizer plants first. “Ice box” types are the most susceptible. In muskmelons and other melons, the upper surface of leaves goes directly from yellow to a bleached white appearance.

Ozone injury on squash and pumpkins is intermediate between watermelon and cantaloupe starting with yellowing of older interior or crown leaves. These leaves subsequently turn a bleached white color with veins often remaining green.

In snap and lima beans, ozone causes small, bleached spots giving a bronze appearance on upper leaf surfaces and pods. Leaves may ultimately turn chlorotic and senesce (drop).

Ozone injury can be easily misdiagnosed as mite injury, pesticide phytotoxicity, or deficiencies.

The key to avoiding air pollution injury is to plant varieties that are of low susceptibility and to limit plant stresses. Certain fungicides such as thiophanate methyl (Topsin and others) offer some protection against ozone damage.



*Ozone injury on squash. Note leaf yellowing.  
Photo: G.Johnson*

## **SMOKE NOT A PROBLEM FOR VEGETABLES**

*--Written by Steve Reiners, Professor in Horticulture, Cornell University, Cornell AgriTech. Originally published in Cornell Cooperative Extension Veg Edge, Vol. 19, Issue 10, June 14, 2023*

Canadian wildfires are impacting air quality here in the Northeast. Smoke has filled the sky and warnings issued for outdoor activities. This is making many growers and gardeners worried about the potential impact the smoke will have on field grown vegetables. The good news is the impact will be minimal at worst.

Smoke filled skies decrease sunlight and reduce photosynthesis but to a small degree and temporarily. Despite the shade, there is still enough diffused light penetrating the smoke to maintain growth. Smoke typically does not block the pores in the leaf (stomata) where photosynthesis happens. The most important thing you can do is maintain good soil moisture by optimizing irrigation. This will keep the pores open and clean. The droughty conditions this spring are likely to cause more of a problem than the smoke.

Concerns that leafy greens and other commodities will pick up a smokey flavor are unwarranted. Recent research done in California after wildfires there showed leafy greens had no issues with flavor or possible volatile chemicals on or within the leaves. The smoke we’re seeing does not contain dangerous chemicals.

The smoke we are experiencing is nearly 100% from the burning forests, not plastics, buildings or chemicals as seen in recent train derailments. The rain that falls through this smoky layer is also not dangerous to plants, people or animals. Unlike acid rain that forms from the burning of high sulfur fuels, the rain will be near neutral pH or just slightly acid.

Pollinators will likely stay close to their hives when it’s smoky. It’s a little early in the season for pollination of squash and other fruiting crops, so this should not be a problem. Even if the crop has flowers, bees will become active again as soon as the smoke clears.

Mask up when you’re outside tending to your plants as the smoke is a danger to you and me. But the vegetables should be fine. Keep them well watered, and you should be enjoying a normal harvest later this summer.

## **ABIOTIC DISORDERS OF TOMATO**

Field tomato season has begun, and high tunnel tomato harvest is already well underway. Now is the time to make sure

you're providing tomatoes with sufficient nutrients and consistent water to avoid some of the disorders described in this article. All of the disorders described in this article are abiotic, meaning they are not caused by living pathogens but instead by environmental factors. In many cases, the answer to avoiding these disorders is proper fertility and consistent irrigation.

**Blossom end rot** is characterized by dark brown or black sunken areas at the blossom end of the fruit. The lesions are a direct result of a localized calcium deficiency at the blossom end. The dead tissue is initially brown or white and leathery but often becomes colonized by the saprophytic fungus *Alternaria alternata*, which only infects dead tissue and produces fuzzy black sporulation. Although calcium deficiencies in the soil are sometimes responsible for blossom end rot, much of the time, blossom end rot is the result of plant water stress. When temperatures increase, so does water demand, and developing fruits have high calcium demand. Calcium is taken up primarily through the water-conducting tissues of the plant, so when the soil is dry, or overly saturated, or the plant's roots are compromised and the plant isn't taking up water, calcium deficiencies develop. The blossom end of the fruit is the last to accumulate calcium, so this is where deficiencies appear. Signs of blossom end rot typically appear two weeks after the deficiency in the plant has occurred.



*Blossom end rot, with Alternaria alternata sporulation. Photo: D. Langston, Univ. of GA, Bugwood.org*

Blossom end rot can be prevented by regular watering to avoid extreme fluctuations in soil moisture. In high tunnel tomatoes, it is recommended to use more than one drip line per bed to ensure that the entire extensive root system is able to supply sufficient water to the lush foliage. Be careful to avoid overwatering, though, as this can lead to root rots or other physiological disorders. Use of soil moisture monitors can help dial in watering needs. High soluble salts, low calcium, and high cation (potassium, magnesium or ammonium) levels in the soil may also contribute to blossom end rot; other cations may out-compete calcium on soil exchange sites, making it unavailable to the plant. **Management:** Plant into sites with good soil drainage. Use plastic or other mulch to maintain soil moisture. Avoid aggressive cultivation that damages crop roots. Maintain sufficient, even soil moisture. Use soil nutrient testing to monitor soil soluble salts and cation ratios and maintain adequate calcium in the soil.

**Leaf roll** is usually a reaction by the plant to conserve water by reducing the surface area exposed to solar radiation. This disorder is often seen just after plants are heavily pruned under dry soil conditions, but oddly enough, leaf roll disorder also has been found to be caused by excess soil moisture coupled with extended high temperatures. If the tomato plant's foliar growth is more vigorous than root growth and we are hit with a hot, dry period, the foliage may transpire water faster than the root system can absorb it from the soil, and the plant's reaction is to roll its leaves up to reduce transpiration. This disorder primarily affects lower leaves. Leaf rolling can also result from growing high-yielding cultivars under high-nitrogen fertility programs. Cultivars selected for high yield or early ripening tend to be the most susceptible and indeterminate cultivars are more sensitive than determinate. The good news is that leaf roll rarely affects plant growth, fruit yield, or fruit quality. Some viruses can look similar to tomato leaf roll, but if the symptoms appear suddenly, involve many of the plants in a field, and largely affects lower leaves, it is probably just physiological leaf roll. **Management:** Reduce symptoms by maintaining consistent, adequate soil moisture (~1 inch per week during the growing season, which will also help with calcium uptake, reducing blossom end rot incidence). Do not prune heavily during hot, dry conditions or over-fertilize with nitrogen.



*Tomato leaf roll*

**Catfacing:** Tomatoes are considered "catfaced" if the blossom scar is enlarged or perforated. This can happen to both field and greenhouse tomatoes and is more common in heirloom cultivars. Varieties with rounder and larger fruit may be more



*Catfacing in heirloom tomatoes. Photo: K. Campbell-Nelson*

susceptible. Often, the fruit becomes extremely misshapen, but fruit distortion is not necessary to classify it as catfaced. This disorder has not been extensively researched and is still not fully understood. Cold temperatures during flowering have been shown to increase incidence of catfacing, as have extreme fluctuations in night versus day temperatures. Damage from thrips to the side of the pistil of tomato flowers can also cause this disorder, and under some conditions, pruning and high nitrogen levels can increase catfacing incidence. Catfacing can increase the chances of fruit becoming infected via the rough blossom scar by black mold rot, a disease caused by several different fungi. **Management:** Avoid excessive pruning and nitrogen fertilization. Avoid low greenhouse temperatures for both greenhouse tomatoes and transplants. Use cultivars that are less prone to catfacing. Remove catfaced fruit so they don't drain plant nutrients.

**Stitching/Zippering** is the term for when a thin, brown, necrotic scar extends from the stem to the blossom end on fruit. The longitudinal scar has small transverse scars along it, making it resemble a zipper or seam. Fruit can have one or several scars. This disorder is purely cosmetic and does not affect the edibility of the fruit but may render fruit unmarketable. Zippering is caused by anthers (the pollen-producing flower part) fused to the ovary wall of newly forming fruit. This disorder occurs more frequently in cool weather. **Management:** Plant cultivars that are less susceptible to stitching/zippering. Avoid low greenhouse temperatures.



*Stitching/zippering.  
Photo: J. Howell*



*Radial cracking (top) and small concentric cracks (bottom).  
Photos: G. Johnson and G. Higgins*

**Fruit cracking** can occur in several different patterns – radial cracks starting at the stem scar, concentric cracks circling the fruit shoulders, small cracks around the shoulders called “rain checking”. These cracks are caused by excessive water uptake by the plant during fruit development, when interior tissues expand faster than the inflexible skin. High temperatures can make fruits more susceptible to cracking, and cultivars with large fruit tend to be more susceptible. Opportunistic fungi and bacteria can enter the fruit through cracks and cause fruit rots. **Management:** Provide even irrigation and plant cultivars with smaller fruit that are less susceptible to cracking.

**Yellow shoulder** is commonly caused by potassium deficiency in tomatoes. Recent surveying by several New England state Extensions has shown that tomatoes, especially high tunnel tomatoes, have very high potassium requirements and crops tend to be deficient. Nutrient recommendations for high tunnel tomatoes have been overhauled in the current edition of the New England Vegetable Management Guide. Current recommendations advise growers to fertilize based on the potential yield of your crop (with indeterminate, disease-resistant cultivars planted early into heated tunnels expected to yield more than heirloom or determinate cultivars planted later). [Click here to see the full recommendations in the high tunnel tomato section of the Guide.](#) One recommendation for K fertility in high tunnel tomatoes is to apply ¼ lb of K/1000 ft<sup>2</sup> through the drip every week for 10 weeks, using potassium sulfate fines. In both the field and high tunnels, the following factors can also lead to K deficiency in tomatoes: waterlogged and/or compacted soils, above-optimal nitrogen application rates, excessive application of potassium competitors, and excessively large or dense canopies. Some cultivars, including those with green shoulders that lack the uniform ripening gene, are also more prone to developing yellow shoulder than others. High temperatures and sun can also cause this disorder, both by directly damaging fruit tissue and by inducing water stress that can limit the uptake of K.



*Yellow shoulder. Photo: G. Higgins*

**Blotchy ripening, gray wall, and internal whitening:** These three disorders are not well-understood and tend to be confused with each other. Blotchy ripening is characterized by yellow or orange discolored areas on tomato fruit surfaces. Tomatoes with gray wall have grayish-brown discolorations on the fruit wall and may also exhibit internal browning. Gray



wall typically appears on green fruit before ripening. ‘Gray wall’ is the term used when the outer fruit walls turn brown or gray and collapse, compared to ‘internal whitening’, which refers to when the outer and inner fruit walls become white and corky. Factors that increase the severity of these disorders include cloudy weather, wet and cool conditions, high nitrogen, low potassium, and compacted soils. Good irrigation and nutrient management will reduce the risk of these disorders.

Ripening disorders, including yellow shoulder, blotchy ripening, gray wall, and internal whitening, are most prevalent when air temperatures during mid-late stages of fruit ripening are extreme (e.g., below 60°F and/or above 90°F) or highly variable, when humidity levels remain high, and/or when these conditions prevail and light levels are low. Unfortunately, these are not uncommon conditions in New England and are largely out of our control. Tomato mosaic virus can cause similar symptoms of uneven fruit ripening and should be ruled out as the underlying cause.



G Brust, University of Maryland

*Internal whitening. Photo: G. Brust*

Jerry Brust, IPM Vegetable Specialist at the University of Maryland, researches the management of abiotic disorders in tomato; he recommends using white plastic mulch laid early in the season to keep the crop cooler and using shade cloth on your most marketable cultivars. In over 5 years of trials, Brust’s research has shown that a 30% filtering shade cloth increases marketable yields by 20-50%, depending on the year. A 4 ft-wide shade cloth covering even a quarter of the crop canopy is sufficient to achieve this increase in yield, and the cloths may be used for many years.

These disorders are irreversible in fruit that are already symptomatic, but changes to fertility and irrigation can prevent the disorder from affecting younger fruit. Take measures now to ensure that your tomatoes are receiving sufficient and consistent water and nutrients and take note of any abiotic disorders that occur this year to make changes to your fertility and irrigation plan for next year.

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*--UMass Extension Vegetable Program*

## **INSECTICIDE PROGRAMS TO CONSIDER FOR ONION THRIPS CONTROL IN ONION IN 2023**

*--Written by Brian Nault, Dept. of Entomology, Cornell Agri-Tech, and Christy Hoepting, CCE – Cornell Vegetable Program. Originally published in Cornell Veg Edge, Volume 19, Issue 9, June 7, 2023.*

Guidelines for using insecticides to manage onion thrips in onion fields in the Great Lakes region continue to evolve as we gain more experience using them under various situations. The following guidelines provide multiple scenarios for managing onion thrips over the season. The major factors used to create these guidelines are efficacy of products under varying levels of thrips pressure and the desire to follow insecticide resistance management principles.

**Disclaimer:** There are other insecticides labeled for use on onion for onion thrips management that also may be effective, but that are not included in these guidelines. These guidelines have been developed based on our personal experience

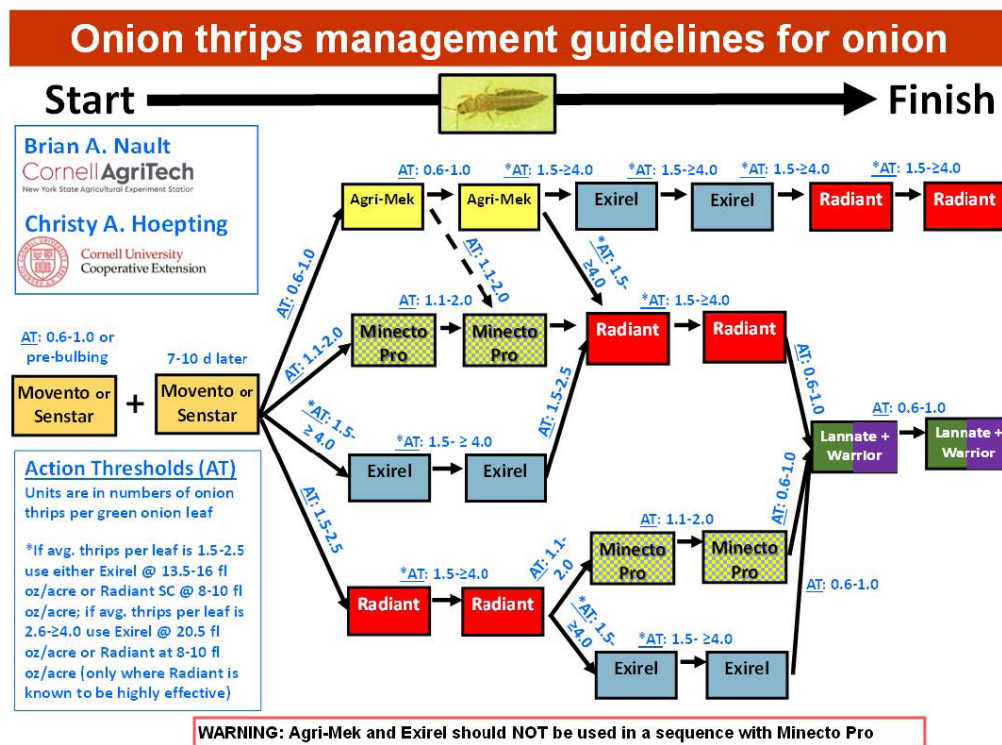
assessing the efficacy of many different products in commercial onion fields or by assessing their performance after application by New York onion growers in their fields.



Thrips on onion, and their silvery, speckled feeding damage.  
Photo: UMass Vegetable Program

### General information

- Insecticides that you prefer for onion thrips control should be considered before following these 2023 guidelines. For example, if an insecticide is giving you good control, keep using it. If an insecticide is no longer providing effective thrips control on your farm then it should be avoided and you can use the guidelines below to select another material.
- The same insecticide should not be used more than twice consecutively, typically applied one week apart, in the same field during the season. If the thrips population is below the action threshold, skip an application that week and resume scouting the following week. If the thrips population exceeds the action threshold the following week, select a product belonging to a different class of chemistry than the previous product applied in that field.
- Efficacy of most insecticides are enhanced when a) co-applied with a surfactant, b) not tank mixed with chlorothalonil containing fungicide, c) applied at a moderate to high gallonage (e.g., 20 - 60 gpa), d) applied at a moderate pressure (40-60 psi), and e) applied using twin flat fan nozzles.



Schematic for possible onion thrips pesticide choices throughout the season.

### How to use the 2023 onion thrips management guidelines for onion

1. **Start with Movento® or Senstar™ Insecticide** - Begin management of onion thrips using two sequential applications of Movento® (spirotetramat) at 5 fl oz per acre. **Movento® is one of the best products to use early in the season for controlling thrips because it kills larvae and may cause females to lay fewer eggs.** Movento is systemic even when applied to foliage, so it moves to new foliage tight in the neck to kill thrips that might not come in contact with other products. In many cases, two weeks of thrips control occurs after the second application of Movento®. Because

Movento® is not as effective after bulbing (e.g., 1-2 inch bulbs), **make sure that Movento® is applied before onions are bulbing or when the thrips population reaches at least 0.6 thrips per leaf.**

An alternative to Movento® is Senstar™ Insecticide, which also contains spirotetramat (the active ingredient on Movento) plus pyriproxyfen (generally used to control whiteflies). While onions are not infested with whiteflies, this product is as effective against onion thrips as Movento®. The Senstar™ label indicates 14 days between applications; however, research has shown that performance of spirotetramat is best when applications are spaced 7-10 days apart. Therefore, starting with Senstar™ and following with Movento® 7-10 days later would be a viable option.

- 2. After Movento, follow action thresholds and rotate insecticide classes** - After Movento® and/or Senstar™ Insecticide applications, there are several options. Knowledge about efficacy of insecticides used previously to manage onion thrips and the relative size of the thrips population will help inform which option might be best. **Based on previous research, action thresholds are determined by how well the insecticide performs against thrips at different infestation levels.** In many research trials conducted in commercial onion fields in New York from 2015-2021, action threshold-based insecticide programs offered the same level of thrips control as weekly insecticide programs, but the action threshold-based insecticide programs used an average of 2.3 fewer insecticide applications as compared to the weekly insecticide program.
- 3. The following insecticide options should be considered based on the thrips pressure.**

#### **Option A: low thrips pressure (0.6 – 1 thrips per leaf)**

**Agri-Mek® SC** (and generics) is an affordable option that is effective for controlling low to moderate populations of onion thrips when applied at a threshold of 0.6 to 1 per leaf. Also, because Agri-Mek® SC has a 30-day pre-harvest interval, it should be considered as an option earlier in the season. If Agri-Mek® SC has underperformed on your farm in recent years, select one of the other options below. If you are not sure how well Agri-Mek® SC performs on your farm and it performs poorly after one application, consider switching to Minecto Pro® instead of making another application of Agri-Mek® SC. Minecto Pro® is typically more effective than Agri-Mek® SC when thrips infestations are moderate to high (see more below).

**A tank mix of Lannate® LV (48 fl oz per acre) and Warrior II with Zeon Technology® (1.92 fl oz/acre)** (and generics or other pyrethroids) is an alternative option that also can be effective for controlling low to moderate populations of onion thrips when applied at a threshold of 0.6 to 1 per leaf. Because this option is the weakest choice for thrips management, its use has been recommended near the end of the season when the desire is to hold a thrips population at a non-economically damaging level until the crop lodges and thrips damage is no longer a concern.

#### **Option B: moderate thrips pressure (1.1 – 2.0 thrips per leaf)**

**Minecto® Pro**, a pre-mix of Agri-mek® SC (abamectin) and Exirel® (cyantraniliprole), is a good option for a moderate thrips infestation. The cost of Minecto® Pro may be higher than some other options (i.e. Agri-Mek® SC), but Minecto Pro® will likely offer superior control of thrips. Consider applying Minecto® Pro at 7 - 10 fl oz per acre twice early to mid-season because it has a 30-day pre-harvest interval, just like Agri-Mek® SC. **Because Minecto Pro® contains abamectin and cyantraniliprole, neither Agri-Mek® SC nor Exirel® can be used in that field for the remainder of the season because this would violate the label and insecticide resistance management plans.** This can be a serious limitation of using Minecto Pro in a season-long thrips management program when high thrips infestations span most of the summer.

#### **Option C: moderate to high thrips pressure (1.5 – ≥4.0 thrips per leaf)**

There are two excellent options, **Exirel®** and **Radiant® SC**, that should be considered for managing moderate to high populations of thrips. The cost of Exirel® and Radiant® SC will likely be higher than other insecticide options (i.e., Agri-Mek® SC and Minecto Pro®), but worth the extra cost because of their effectiveness against higher populations of thrips.

- If the thrips infestation averages 1.5 – 2.5 thrips per leaf: Exirel® should be used at a low to moderate rate (13.5 – 16 fl oz/acre) and Radiant® SC at a moderate to high rate (8 – 10 fl oz/acre).
- If the thrips infestation averages 2.6 – ≥4 thrips per leaf, consider Exirel® at a high rate (20.5 fl oz/acre). Only in fields where Radiant® SC is known to be highly effective should it be considered as a viable option at this higher threshold. Use Radiant® SC at the same moderate to high rate of 8 – 10 fl oz/acre. In fields where the high rate of

2023 Insecticide and Action Thresholds Recommendations for Onion Thrips Management in Onion				
Trade Name	Active Ingredient	Recommended rate/acre (Maximum rate/crop/ season)	IRAC <sup>1</sup> Group	Action Threshold (Average number of thrips per leaf)
Movento	spirotetramat	5 fl oz (Max: 10 fl oz)	23	0.6 – 1.0; or pre-bulbing <sup>3</sup>
Senstar <sup>2</sup>	spirotetramat + pyriproxyfen	10 fl oz (Max: 20 fl oz)	23 + 7C	0.6 – 1.0; or pre-bulbing <sup>3</sup>
Agri-Mek SC (and generics)	abamectin	3.5 fl oz (Max: 12.25 fl oz)	6	0.6 – 1.0
Minecto Pro	abamectin + cyantraniliprole	7.5 – 10 fl oz (Max: 20 fl oz)	6 28	1.1 – 2.0
Exirel	cyantraniliprole	13.5 – 20.5 fl oz (Max: 61.6 fl oz)	28	1.5 – 2.5: 13.5 – 16 fl oz 2.6 - ≥4.0: 20.5 fl oz
Radiant SC	spinetoram	8-10 fl oz (Max: 30 fl oz)	5	1.5 – ≥4.0 <sup>4</sup>
Warrior II w/Zeon Technology (and generics or other pyrethroids)	lambda-cyhalo- thrin	1.92 fl oz (Max: 15.36 fl oz)	3A	0.6 – 1.0 Only use in tank mix with Lannate LV
Lannate LV	methomyl	48 fl oz (Max: 12 pt)	1A	0.6 – 1.0 Only use in tank mix with a pyrethroid like lambda- cyhalothrin

<sup>1</sup>IRAC: Insecticide Resistance Action Committee – Mode of Action.  
<sup>2</sup>Senstar requires 14 days between applications, whereas Movento applications can be spaced 7-10 days apart.  
<sup>3</sup>Movento and Senstar do not work very well when the onion plant is bulbing. To take advantage of this highly effective chemistry, make the first application either at threshold or at the pre-bulbing crop stage, whichever comes first.  
<sup>4</sup>Radiant should be used at a moderate to high rate (8 – 10 fl oz/acre) when population averages 1.5 – 2.5 thrips per leaf; for populations known to be highly susceptible to Radiant SC, the same rate can be used at a threshold of 2.6 – ≥ 4.0 per leaf.

Radiant® SC no longer effectively controls high populations of thrips, consider using Exirel®.

## NEWS

### MDAR ANNOUNCES LOCAL FOOD PURCHASE ASSISTANCE PLUS GRANT PROGRAM (LFPA PLUS)

The goal of the LFPA Plus program is to maintain and improve food and agricultural supply chain resiliency through the purchase of domestic food from local and regional producers, by targeting purchases from Socially Disadvantaged farmers/producers and distribution to underserved communities. LFPA Plus grants ranging from \$50,000 to \$1,000,000 will be awarded solely for food and food storage purchases.

Two informational webinars will be provided, where questions may be asked will be held for interested applicants

on the dates listed below. Please contact Rebecca Davidson at [Rebecca.Davidson@mass.gov](mailto:Rebecca.Davidson@mass.gov) to request access to the webinar if you have trouble with the following links:

Thursday, June 22nd from 6:00pm - 7:30 pm -- Register here: [https://us06web.zoom.us/webinar/register/WN\\_J8GTL6e9RWyhnC3Hi2m8WO#/registration](https://us06web.zoom.us/webinar/register/WN_J8GTL6e9RWyhnC3Hi2m8WO#/registration)

Tuesday, July 11th from 12:00 pm - 1:30 pm -- Register here: [https://us06web.zoom.us/webinar/register/WN\\_0S\\_Idz-PzQTyZLtZeT3GUDw#/registration](https://us06web.zoom.us/webinar/register/WN_0S_Idz-PzQTyZLtZeT3GUDw#/registration)

MDAR's LFPA Plus Program is now open. Deadline to submit an application is Friday August 4, 2023 at 3:00 pm.

Complete details of LFPA and the LFPA Plus Programs [here](#).

## EVENTS

### EASTERN MA CRAFT PEST AND DISEASE CONTROL FIELD WALK WITH UMASS EXTENSION

**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. Click [here](#) for the event page.

### [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 TWILIGHT MEETINGS

UNH is hosting a series of meetings on the following topics. For each one, there is a meeting next week on June 22nd.

- Sweet Corn IPM
- Food safety and wash and pack sheds
- High tunnel crop production

See [this link](#) for a full event list.

### UCONN EXTENSION: DIAGNOSIS AND MANAGEMENT OF PLANT DISEASES IN ORNAMENTAL GREENHOUSES WORKSHOP

**When:** Thursday, June 29, 2023

**Where:** Jones Auditorium, Connecticut Agricultural Experiment Station, 123 Huntington St., New Haven, CT. The entrance to Jones Auditorium is at the north end of the building, on the side away from Huntington Street. In addition to the parking lots on campus, there is street parking on Huntington Street and East Rock Road.

**Registration:** \$40 per person. Registration includes boxed lunch. Online registration at Greenhouse Training Store. If you would like to pay by check, please contact Leanne Pundt (860-626-6855 or [leanne.pundt@uconn.edu](mailto:leanne.pundt@uconn.edu)). Registration will end at 5:00 p.m. on Thursday, June 22, 2023. The registration fee is refundable 48 hours before the event. Please note there is a maximum capacity of 70 attendees. Walk-in registrations are not an option. [Click here to register.](#)

*Up to 5 pesticide recertification credits are available for selected talks.*

With questions about registration or refunds please contact Carla Caballero at [carla.caballero@uconn.edu](mailto:carla.caballero@uconn.edu). With questions about the program or payment, please email Leanne Pundt [leanne.pundt@uconn.edu](mailto:leanne.pundt@uconn.edu).

### TWILIGHT MEETING: [IRRIGATION SYSTEMS AND MANAGEMENT AT WARNER FARM](#)

**When:** Thursday, July 13, 4:00 pm - 6:00 pm

**Where:** Warner Farm, 23 South Main Street, Sunderland, MA, United States

**Registration:** Free! [Click here to register.](#)

Warner Farm, a CSA and wholesale farm as well as the home of Mike's Corn Maze, located in Sunderland, MA, has been developing its irrigation capacity since the late 1970s. The farm's rich sandy loam has been growing fruit and vegetable crops for centuries and as a changing climate brings changing precipitation patterns to New England, Warner Farm is poised to respond effectively in times of drought.

Join CISA, the UMass Extension Vegetable Program, and Dave Wissemann of Warner Farm on July 13th at 4:00pm for an up close look at how they are optimizing their water resources and water distribution systems to ensure the sustainable production of crops throughout the season and in the face of increasingly uncertain growing conditions. The workshop includes a farm walk to see irrigation equipment and set up and a detailed explanation of how the farm's systems are designed and maintained. Following the farm walk, join us for further discussion and some locally produced drinks and snacks.

#### **TWILIGHT MEETING: [SAWYER FARM REDUCED-TILL PERENNIAL CLOVER TRIALS](#)**

**When:** Thursday, July 20, 4:00 pm - 6:00 pm

**Where:** Sawyer Farm, 19 Sawyer Road, Worthington, MA, United States

**Registration:** Free! [Click here to register.](#)

Over the past several seasons, farmers at Sawyer have been experimenting with different ways to plant row crops into perennial white clover and reduce tillage using a series of innovative practices. Join Sawyer Farm's Lincoln Fishman for a close look at transplanter shoe adaptations designed to reduce soil disturbance and weed competition in perennial clover and cash crop production. Berkshire Conservation District will also display their no-till drill seeder, which is available for rentals and can be used for mixed or single species applications from clovers and orchard grass to rye and soybeans.

This in-person workshop will be followed with an on-farm networking opportunity. The workshop will take a close look at the system and the research underway with UMass through a SARE Partnership Grant, and is part of CISA's 2023 Adapt Your Farm to Climate Change Webinar and Workshop Series: On-farm Climate Change Adaptation Case Studies from western Massachusetts.

*This event is co-sponsored by CISA and the UMass Extension Vegetable Program.*

#### **TWILIGHT MEETING AT PARLEE FARMS**

**When:** Tuesday, August 15

**Where:** Parlee Farms, 95 Farwell Rd, Tyngsborough, MA 01879

Join UMass Extension to hear about pumpkin varieties grown at Parlee Farms, as well as sweet corn IPM and automated irrigation systems.

#### **SOUTH DEERFIELD RESEARCH FARM FIELD DAY**

**When:** Wednesday, August 16

**Where:** UMass Amherst Crop and Animal Research and Education Farm, 91 River Rd., 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.

#### **TWILIGHT MEETING AT HEART BEETS FARM: SWEET POTATO PRODUCTION AND FALL PEST MANAGEMENT**

**When:** Thursday, September 21, 4-6pm

**Where:** Heart Beets Farm, 181 Bayview Ave, Berkley, MA 02779

Join UMass Extension to hear about sweet potato production at Heart Beets Farm, and to learn timely info about fall pest management.

When: Saturday, October 21, 4-6pm

Where: Farmer Dave's, Dracut, MA

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