



UMass  
Extension

# Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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## CROP CONDITIONS

Many farms have had crop failures this year and now have land that is empty earlier than expected. If you can find seeds, it's not too late to plant: seed some brassicas to transplant (broccoli, cauliflower, kale, cabbage – look for varieties with the shortest days-to-maturity) or direct-seed lettuces, spinach, brassica salad greens, radishes, and turnips. You can also take the opportunity to get more cover crops into the ground this year—see the article in this issue for some recommendations for cover crop species to use. Brassicas and other crops planted later in July are looking good, which is a relief to see.

We had a great twilight meeting on cover crops last night, at Appleton

Farm in Ipswich! We have two more upcoming meetings. Next Wednesday, we have an [in-person twilight meeting at Ward's Berry Farm](#) in Sharon, where we'll hear about using UV-light for disease management, some on-farm trials, and a round-table discussion of pests of the year. Then on September 1, we're holding a [lunchtime Zoom webinar on the economics of winter spinach production](#), where we'll present case studies from three farms. It has been great to see so many folks in-person this season—we hope you can join us for these upcoming events as well! Click the links in this paragraph for more info and registration.



*Growers listen to Jason Lilley from UMaine Extension and farmer Andrew Lawson talk about cover crops at the Appleton Farm twilight meeting yesterday.*

*Photo: S.B. Scheufele*

## PEST ALERTS

### Brassicas

The usual suspects – [flea beetles](#), [caterpillars](#), [Alternaria leaf spot](#), and [black rot](#) continue to be the main pest issues in waxy

and non-waxy brassicas at this point in the season. Waxy brassica crops that were planted in July and are being harvested now may benefit from sidedressing with fertilizer to replace nutrients that were washed away by the excessive rain.

We have received several reports of phytotoxicity in brassicas, resulting from copper applied along with an adjuvant. Adjuvants help pesticides spread out on and stick to waxy crop leaves and we routinely recommend including one when spraying brassica and allium crops. However, some pesticides should not be applied along with an adjuvant—be sure to check the label of any material you are applying for this information. Copper is damaging to a wide-range of organisms, which makes it an effective pesticide but which means it can also harm leaf tissues. Adjuvants like spreader stickers, oils, or soaps that break the surface tension of the spray solution can allow the copper to enter the plant leaf—when this happens, phytotoxicity can occur. Phytotoxicity can also develop if copper is applied under hot (e.g. above 85°F) or very humid conditions. For more information about how copper works and how to use safely and effectively, see our [Using Copper Fungicides](#) article.

[Cabbage root maggots](#) and damage (stunted, discolored, or collapsed plants and uneven stands) were reported this week in two locations in Franklin Co. Normally we do not see much damage from this pest at this time of year. The

## 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](mailto:umassveg@umass.edu)

**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).

conventional wisdom is that the soil temperatures are too high, and eggs are killed or hatching maggots desiccate before they can do much harm. Perhaps the wet and generally cooler weather this year allowed more of these maggots to survive and cause damage. It may be too late to take control now, but if you are seeing poor stands of fall brassica plantings, dig up a few plants and look for chewing damage to the lower stem, loss of roots, or presence of maggots. There will be at least one more generation of root maggot adult flight and egg-laying later in the fall which affects later brassica root crops, making rotten tunnels on radishes, turnips, and rutabagas.



*Cabbage root maggot*

### Chenopods

[Leafminer](#) tunneling was observed in Swiss chard in Franklin Co. this week. There are 3-4 generations of spinach and beet leafminer per year; we see peak activity in mid- to late-May, late-June, and early-August. Adult flies lay eggs on the undersides of host leaves, and the resulting larvae enter the leaves to feed between the upper and lower leaf epidermis before dropping to the soil to pupate. If you are still transplanting beets or chard, some systemic insecticides may be applied to transplants or the soil, including diamides (e.g. Coragen, Verimark) and neonicotinoids (e.g. Venom, Platinum). Other materials are labeled for foliar applications – see the [beet and Swiss chard](#) or [spinach](#) insect control sections of the New England Vegetable Management Guide for complete lists. Note that several products that are labeled for spinach and Swiss chard are not allowed for beets. Of the OMRI-listed products, spinosad has demonstrated efficacy if applied before egg hatch. Entrust and Radiant both also have some translaminar activity and may be effective against larvae within mines. Include a penetrating adjuvant to maximize translaminar activity.



*Leafminer damage in Swiss chard*

### Cucurbits

[Anthracnose](#) was diagnosed in cucumber in Hampshire Co. this week. Anthracnose, caused by the fungus *Colletotrichum orbiculare*, forms round, brown lesions on leaves and dark, sunken lesions on fruit. The center of leaf lesions often fall out, creating a “shot-hole” appearance. The fungus can be seed-borne and also survives on crop residue or volunteer plants. The disease is favored by hot, humid weather. [Resistant varieties](#) of cucumber and watermelon are available but there are no resistant cantaloupe varieties. Follow a minimum 2-year crop rotation out of cucurbits. Using drip as opposed to overhead irrigation, and avoiding working in fields when foliage is wet can minimize the spread of foliar diseases like anthracnose. Fungicides may slow the spread of foliar diseases if applications begin before or just after symptoms first appear. See the [cucumber, muskmelon, and watermelon](#) or [pumpkin, squash, and gourds](#) disease control sections of the New England Vegetable Man-



*Cucumber anthracnose*

agement Guide for lists of labeled fungicides.

**Choanephora fruit rot** is continuing to be reported throughout the Northeast. This fungal pathogen infects developing cucurbit fruit and forms fuzzy gray sporulation that starts on the blossom end and moves inward. The fungus survives from season to season on crop debris and infects plants in warm, wet conditions. The disease tends to infect a flush of plants during wet periods and will cease to be a problem when weather dries out. There are no chemical controls for *Choanephora* rot; planting cucurbits into well-drained fields and taking measures to increase air flow in plantings can reduce incidence.



*Choanephora fruit rot*

**Squash vine borer** trap counts remain low, but larvae are continuing to feed within vines of thick-stemmed cucurbit crops (zucchini, summer squash, some winter squash, giant pumpkins). Feeding damage at the base of the plants causes entire vines or plants to wilt. Inspect wilting vines for entry holes, usually easy to notice by the large amount of sawdust-like frass present. If the larvae haven't exited the vine to pupate in the soil, they can be found higher up in the vine from their entry hole. If you are seeing SVB in your crop this year, plan to rotate thick-stemmed cucurbits from this year's infested fields, and till under infested crops thoroughly and as soon as harvest is done, to kill as many larvae as possible.

Table 1. Squash Vine Borer trap captures, week ending August 11, 2021	
Location	SVB
Deerfield	1
North Easton	1
Westhampton	3
Whately	0
Sharon	0
Leominster	1

### Solanaceous

**Late blight** was confirmed this week in potato in Aroostook Co., ME. The outbreak is reported to be fairly well contained and the source is suspected to be infected potato seed. Other than this outbreak in far northern ME, late blight has otherwise only been reported in Georgia and Wisconsin.

Mites and **potato leafhoppers** are being reported in eggplant, pepper, and tomato as well as beans, squash, and strawberries. Both **broad mites** and **two-spotted spider mites** (TSSM) affect solanaceous crops—broad mites are the most heavy hitting on pepper, and TSSM are particularly devastating on eggplant and tomato, though they can both affect a variety of crops, including strawberries. Mite development is favored by hot, dry, and dusty conditions, which also aggravate mite injury by stressing the plant. Damage is often underestimated since both the mites and the wounds they cause are difficult to see without inspecting plants closely, or until the problem becomes widespread. Preventative releases of the predatory mite, *Phytoseiulus persimilis*, may suppress TSSM populations in vegetable fields, as they do in strawberry fields. *Amblyseius fallicis* is a predatory mite that is widely used in greenhouses. Agrimek is a highly effective material for mites, **others** include pyrethroids, soaps, and oils. Leafhoppers affect a wide range of vegetable and fruit crops including bean, potato, eggplant, and raspberry. Leafhoppers suck plant sap from leaves and cause “hopperburn”, where leaf edges turn yellow, cup downward and later turn brown and appear scorched. On eggplant, hopperburn can resemble *Verticillium* wilt. Pyrethroids, noenicitinoids and azadiractin containing products can suppress leafhopper populations.



*Broad mite damage on pepper (left), Photo: S. Ghimire*  
*Two-spotted spider mite damage on eggplant (right), Photo: J. Boucher*

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*Hopperburn on eggplant.*  
*Photo: H. Whitehead*

**Spotted wing drosophila** is present now in blueberries and raspberries, and can also

affect cherry tomatoes, especially when a lot of cracking occurs. Blueberries and raspberries should be sprayed now on a 5-7 day schedule. Berry growers using Mustang Maxx alternated with Assail report good control.

**Stemphylium blight**, or **gray leaf spot**, was diagnosed in tomato again this week in several new loations. This disease is less common than other fungal leaf spots but has been widely reported throughout the region this summer due to the wet weather. Symptoms can vary but are generally irregularly shaped, starting small and expanding to coalesce into larger blighted areas. Leaf spots tend to be gray-brown and gray sporulation is sometimes visible at the center of the spots. Stemphylium may be listed as “gray leaf spot” on some labels, but is not widely listed on fungicide labels. In MA it is legal to use a pesticide as long as the crop is listed on the material’s label—the specific pest does not need to be on the label. Fungicides effective against other fungal foliar diseases of tomato like Septoria leaf spot and early blight (e.g. FRAC Groups 3, 7, 11, and coppers) should be effective against Stemphylium as well.

### Sweet Corn

We have gotten many reports of sweet corn fertility issues this summer, in fields where nutrients were washed away by the rain in July. Sidedressing if corn is less than 18” tall may be effective; if corn is larger than that, adding fertilizer at this point will likely have little effect on yield. Granular fertilizers tend to have higher %N than foliar applied products.

**European corn borer** numbers are similar to last week as we continue to make our way through the second flight of ECB. **Corn earworm** numbers are dropping but we may see another spike with tropical storms in the forecast. At most sites, trapping data indicate no spray is needed or a 5-6-day schedule is suggested. However, **fall armyworm** is active now with damage showing up in whorl stage corn so it is a good idea to scout for FAW and ECB and spray if damage is over 15%.

Location	GDD (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
<b>Western MA</b>						
Deerfield	1871	1	0	7	0	<i>no spray</i>
Southwick	1810	2	0	1	2	<i>6 days</i>
Whately	1936	8	0	0	1	<i>no spray</i>
<b>Central MA</b>						
Bolton	1833	4	0	-	0	<i>no spray</i>
Leominster	1788	2	0	1	5	<i>5 days</i>
Northbridge	1677	2	3	1	0	<i>no spray</i>
Spencer	1736	0	0	2	3	<i>6 days</i>
<b>Eastern MA</b>						
Ipswich	1721	0	0	1	2	<i>6 days</i>
Concord	1819	0	0	0	1	<i>no spray</i>
Millis	-	3	1	N/A	3	<i>6 days</i>
North Easton	1866	0	0	-	2	<i>6 days</i>
Sharon		5	2	N/A	0	<i>no spray</i>
Seekonk	2048	1	0	12	1	<i>no spray</i>
Swansea		2	0	0	3	<i>6 days</i>
- 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						

## LATE-SEASON COVER CROPS

Fields that may be done producing earlier than planned this year offer an opportunity to get a cover crop into the ground earlier than normal. A well-established late-season cover crop increase organic matter, improve soil structure, scavenge remaining nutrients, choke out weeds, and prevent soil erosion. Each cover crop species has strengths and weaknesses. We have noticed that the fall planting window has extended, in some cases into November! Below is a list of several good choices for getting ground cover when crops are finished for the season, depending on your specific goals and field conditions.

**GRASSES** can reduce erosion and return a significant portion of organic matter and other nutrients to the soil if planted after removing a seasonal crop and if given enough time to mature. Kill grasses before maturity in the spring to ensure efficient decomposition. Mix grass species with a legume to reduce the C:N ratio and supply more nitrogen for the following year’s crop, or with any broadleaf species to increase weed suppression.

**Annual or Italian ryegrass (*Lolium multiflorum*) and perennial ryegrass (*Lolium perenne*)** are gaining popularity with some growers because of increasing availability of commercial varieties such as ‘Fria Annual Rye’. These

grasses' have dense root systems that outcompete weeds, protect against erosion, and are easy to incorporate in the spring. Annual ryegrass can tolerate some flooding. Perennial ryegrass is more cold-hardy but also harder to kill if it goes to seed. Both are shade tolerant but may not germinate very well under dry conditions. Plant 6-8 weeks before the fall frost date. The seed is small and light, so specialized equipment such as a Brillion seeder is needed to seed a large area. **Seeding rate:** 20-30 lbs/A broadcast; 10-20 lbs/A drilled; 8-15 lbs/A mixed with a legume.

**Winter or cereal rye (*Secale cereale*)** is the most common cover crop used by growers in Massachusetts. It is inexpensive, easy to get and to establish, and can be seeded up until 2 weeks before a killing frost. However, it is best planted before September 15<sup>th</sup> in order to recover the available N from the soil and produce enough canopy to outcompete weeds and protect the soil from erosion. It consistently overwinters here and will continue to grow in the spring, producing up to 7,000 lbs/A of biomass contributing to soil organic matter. It should be seeded with a legume to keep the C:N ratio low, making more N available in the spring. It can take several weeks and multiple tillage passes to break down in the spring; some growers are hesitant to use this cover crop because of the longer decomposition rate and allelopathic effects on direct-seeded spring crops. **Seeding rate:** 90-120 lbs/A broadcast; 60-120 lbs/A drilled; 50-60 lbs/A mixed with a legume.

**Winter wheat (*Triticum aestivum*)** is increasingly being used as a cereal grain and as a cover crop. It is winter hardy, but does not grow as tall or mature as quickly as rye so there is no rush to kill it in early spring and risk compacting wet soils. Wheat is excellent for erosion control, scavenging N, P, and K, building soil organic matter, and improving tilth. For best results, plant it in late-summer to early-fall, before September 15<sup>th</sup>. Best growth will be in well-drained soils with moderate fertility. Rye is a better choice on wet soils. Wheat works well as a nurse crop for legumes such as hairy vetch, clover, or peas. **Seeding rate:** 90-160 lbs/A broadcast; 60-120 lbs/A drilled; 60-90 lbs/A mixed with a legume.

**Triticale (*x Triticosecale*)** is a hybrid between wheat and rye. It can be seeded as early as August and can produce more fall growth than winter wheat, providing more weed suppression and erosion control. **Seeding rate:** 90-100 lbs/A broadcast; 75-80 lbs/A drilled; 60-90 lbs/A mixed with a legume.

**Oats (*Avena sativa*)** come up quickly and can be seeded in the late-summer. It is best planted before September 15<sup>th</sup>, similar to winter rye. Unlike winter rye, oats will winterkill in Massachusetts, making for simpler field preparation in the spring. However, oats provide less weed control and lower organic matter contribution. To maximize nitrogen carry-over to the following crop, mix with a legume that will overwinter such as hairy vetch. **Seeding rate:** 110-140 lbs/A broadcast; 80-110 lbs/A drilled; 60-90 lbs/A mixed with a legume.



Oats and peas

**LEGUMES** are a good choice if you are interested in adding nitrogen to the soil and reducing nitrogen fertility bill. Before planting, it is important to inoculate seed with the appropriate root-nodulating bacteria that will fix nitrogen from the air. Some growers use Coca-Cola or sugar water to help the inoculum stick to the seed; plant while the seed is still wet to keep the bacteria alive. There are several bacterial inoculants that are each specific to certain legumes and therefore must be used with the correct plant groups in order to establish. If well-managed, legume cover crops can provide as much as 100-150 lbs N per acre to the following crop. Imagine the fertilizer cost savings!



Rye and vetch.

Photo: K. Campbell-Nelson

**Hairy vetch (*Vicia villosa*)** usually benefits from growing with a nurse crop such as rye, oats, or wheat to help reduce matting during the spring and to keep weeds down. The vetch and the grain can be mixed together in the seed drill or broadcast seeder. A vetch + grass cover crop mixture retains more soil moisture than a grass planted alone. In the spring, incorporate vetch at early bloom, typically in late-May. If the vetch is planted in late-July or early-August, it is less likely to survive the winter, which can be a good thing if you've ever struggled with vetch that has re-seeded itself. With a good flail mower, vetch can be used in a reduced tillage system without matting and tangling in

the equipment. **Seeding rate:** 25-40 lbs/A broadcast; 15-40 lbs/A drilled, 15-20 lbs/A mixed with a grass.

**Red clover (*Trifolium pratense*)** is a short-lived perennial that is somewhat tolerant of soil acidity and poor drainage. Mammoth red clover produces more biomass for plow-down than medium red clover, but does not regrow as well after mowing. Mammoth will often establish better than medium red clover in dry or acid soils. Sow in early-spring or late-summer. Red clover can be under-sown in mid-summer into corn or winter squash before it vines, and into other crops such as fall brassicas if soil moisture is plentiful. Clovers germinate and grow slowly and so can be planted along with a faster-growing grass and/or peas as a nurse crop. Clovers are a good option to include in a field that won't be planted into a cash crop for a full year or more. **Seeding rate:** 10-15 lbs/A broadcast; 6-15 lbs/A drilled; 6-10 lbs/A mixed with a grass.



*Crimson clover. Photo: K. Campbell-Nelson*

**Crimson clover (*Trifolium incarnatum*)** grown as a winter annual should be seeded early-August to early-September in New England; seed it too early and it will make seeds in the fall and won't re-grow until spring soils warm up. While it grows well in dry conditions, it may have trouble germinating. This clover is a better fall weed suppressor than hairy vetch. This crop is easily killed by incorporation or can even be rolled or mowed in the spring at late-bloom stage for no-till operations. See notes above in the red clover section about germination speed. **Seeding rate:** 22-30 lbs/A (15-20 lbs/A in a mixture) broadcast; 15-18 lb/A (10-12 lbs/A in a mixture) drilled.

**Field pea (*Pisum sativum* subsp. *arvense*)** also known as Austrian winter peas (black peas) or Canadian field peas (spring peas) should be planted mid-August to mid-September in much of New England. These peas fix nitrogen more quickly in dry conditions than white clover, crimson clover, or hairy vetch. Field peas are susceptible to *Sclerotinia* so don't plant them in a field with a history of white mold. Drill or incorporate seed 1-3 inches deep to ensure good soil moisture contact. **Seeding rate:** 80-120 lbs/A broadcast; 75-100 lbs/A drilled; 60-80 lbs/A in a mix.

**BRASSICAS** are used as cover crops for pest management or, in the case of the tillage radish, for improving water drainage and soil structure. Brassica cover crop species are susceptible to the same pests as brassica cash crops, so be sure to factor in any brassica cover crops that you plant when planning crop rotations for pest management.

**Tillage radish (*Raphanus sativus*)** is also known as daikon, forage, or oilseed radish. They act as biological subsoilers as their taproots can grow to 8-14 inches long. With its deep roots, this cover crop can recover N, P, S, Ca, and B for the following season, but a cash crop must be planted early in the spring or else these nutrients are lost through fast decomposition and the deep root holes. Best planted in late-August, this cover crop typically winterkills in November or December. A unique no-till strategy with forage radish includes seeding it in the late summer along with cover crop mixtures on 6-ft. centered beds, then in the spring, place transplant plugs directly in the holes where the radishes grew. This cover crop releases most of its harvested N by May, unless seeded with a grass such as oats. Higher seeding rates are effective for weed management, while lower seeding rates are better for breaking compaction. **Seeding rate:** 10-13 lbs/A broadcast; 7-10lbs/A drilled; 5-8 lbs/A in a mixture.

**Brown mustard (*Brassica juncea*)** found in many of the 'Caliente' seed mixes is a biofumigant planted to combat root-knot nematode and a variety of soil-borne fungal pathogens, including *Fusarium*, *Verticillium*, *Rhizoctonia*, *Pythium*, and *Phytophthora capsici*. It is also allelopathic against weeds. If allowed to flower, this crop is highly attractive to honey bees. Successful biofumigation with this cover crop is achieved by following these steps: 1) Apply adequate fertility (50 lbs N/A and 20 lbs S/A); 2) allow it to flower before incorporation; 3) mow, disc, or rototill under, and roll or pack the soil immediately; 6) irrigate after incorporation or incorporate before rain to enhance fumigation. Plant brown mustard in late-August through September. Other



*Flowering mustard crop*

brassica cover crops include rapeseed or canola and turnips, which are often used as livestock forage. **Seeding rate:** 10-15lbs/A broadcast; 8-12 lbs/A drilled.

It is always better to plant a cover crop, regardless of the type, than leave a field bare; leaving a field bare over the winter is very damaging to soil structure, increasing erosion and reducing long-term fertility. Though it may take several growing seasons or a lifetime to perfect the art of cover cropping, your soil will thank you.

#### Resources:

Northeast Cover Crops Council [Cover Crop Explorer](#) and [Species Selector Tool](#)

[A Comprehensive Guide to Cover Crop Species Used in the Northeast United States](#). Prepared by USDA-NRCS.

[Managing Cover Crops Profitably](#). 3rd ed. Published by the Sustainable Agriculture Network, Beltsville, MD.

[Cover Crop Plant Guides](#) prepared for USDA by NRCS, RMA and FSA.

[Cover Crop Chart](#) prepared by USDA-ARS.

--Compiled by Katie Campbell-Nelson. Adapted from work by R. Hazzard & F. Mangan, UMass, Vern Grubinger, UVM and Thomas Bjorkman, Cornell. Reviewed by Julie Fine, 2016.

## HORNWORM IN TOMATO

Late-July and early-August are usually the time when we see tomato and tobacco hornworms. These large caterpillars typically appear in small numbers and cause major feeding damage to just a few leaves or plants. Larvae consume large amounts of foliage on peppers, tomatoes, eggplant, potatoes, and related solanaceous weeds. Now is the time to scout by searching leaves for damage, frass or larvae. Often, one sees defoliated stalks, or the characteristic dark-green droppings (fecal pellets), before the caterpillar is located.

The adult tomato hornworm (*Manduca quinquemaculata*) is also known as the five-spotted hawk moth. The adult tobacco hornworm (*Manduca sexta*) is also known as the Carolina sphinx. Both species appear as large moths, predominately gray or gray-brown with lighter markings. Their wingspread may reach five inches. There is one generation per year in northern areas. They emerge from overwintered pupae in the soil in late-spring or early-summer. The moths are commonly seen at dusk, hovering hummingbird-like over beds of petunias and other flowers with long corollas. Nectar is extracted through their long, coiled, tube-like mouthparts.



*Cocoons of a parasitic braconid wasp attached to tobacco hornworm caterpillars.*

*Photo: R. Hazzard*

The spherical greenish-yellow eggs are deposited singly on the undersides of host plant leaves. The eggs hatch in approximately one week, and larvae begin feeding on foliage. Larvae feed for 3-4 weeks, molt five times, and may reach four inches in length and 1/2 inch in width when full grown. The species are green with a distinct "horn" on the top of the tail end. The sides of the tomato hornworm are marked with a series of white marks resembling a "v" laying on its side and pointing toward the head. The tobacco hornworm has white marks on the sides which form a series of seven diagonal lines. The tip of the tomato hornworm's horn is black, while that of the tobacco hornworm's is red. Full-grown larvae burrow 3-4 inches into the soil and form dark brown, two-inch long pupae. A sheath for the mouthparts projects from the head of the pupa and curves downward, resembling the handle of a pitcher.

A parasitic braconid wasp is an important and fairly common natural enemy of the hornworms. The wasps lay their eggs inside the body of the caterpillars. After feeding within the caterpillar body, the larvae of the wasps eat out through the skin and spin the cocoons on the caterpillar surface. The adult wasps later cut out circular lids and escape from the cocoons to attack other hornworms. If one is hand-picking hornworms, those with cocoons of parasitic wasps on their back should not be killed.

**Controls:** There is no set economic threshold for this pest in tomato. Where damage is unacceptable, or if there are high numbers, foliar sprays can be used. Use a selective material that will conserve beneficial insects, because those predators and parasites are very likely keeping your aphid populations under control. Insecticides which are specific for caterpil-

lars include *Bacillus thuringiensis* (Bt) *kurstaki* or *aizawi* strain (Dipel DF, Agree, or Xentari, etc.), indoxycarb (Avaunt), tebufenozide (Confirm 2F), or spinosad (SpinTor 2SC or Entrust). Several synthetic pyrethroids are also labeled (Note: these could result in aphid outbreaks). Although Bt usually works best on small larvae, in this case it will work very well even against large hornworms. In peppers, any controls used for European corn borer should control hornworms.

--UMass Extension Vegetable Program

## **PREVENTING BIRD DAMAGE TO SWEET CORN**

Bird damage in sweet corn is always a problem. Although it tends to be worse in a dry year, we are certainly seeing a lot of damage this year, despite the rainy July. To be successful controlling birds, it is best to take action in advance of the problem, because once birds get in the habit of feeding on your corn, it will be harder to stop them. Redwing blackbirds and other flocking birds can cause serious crop losses in some fields. Unfortunately there is no easy answer and no guarantee that a particular tactic will work.

Redwing blackbirds nest in hayfields, marshes, and ditches and congregate at large nighttime roosts near their nesting sites. Large flocks feed in fields and bottomlands, and the worst damage to sweet corn is reported by growers near rivers and marshes. Insects are the dominant food in the nesting season (May through July), then the diet shifts to grain and weed seeds in late summer. This, along with the expanding acreage of ripening sweet corn in mid-July, may explain the 'sudden' appearance of flocks in sweet corn at this time. Grains that are affected by redwing blackbirds include sweet corn, ripening grain corn, sunflower, sorghum, and oats.



*Bird damage at a farm in Berkshire county this week.*

### **General Tips on Repelling Birds**

*Time any control techniques so they are in place BEFORE harvest, and remain in place until harvest is complete.* Birds invade sweet corn fields about three days before picking.

*Use multiple tactics* that reach more than one sensory mode. For example, combine scare-eye balloons with auditory repellents like shellcrackers or distress calls. This is likely to be more effective than using one tactic alone.

*Move devices frequently.* Birds can learn and become habituated to any device that is used for a long time in one place.

*Leave old corn for birds to eat.* After harvest, scare devices can be removed from one block and concentrated in the next block. Try to keep the birds foraging in the old block while delaying their move to the one that's ready for harvest. Some growers allow birds to scavenge in the old block before disking it in. A method that some growers say works is to rotary mow or disc the interior blocks of the previously harvested fields. Birds like to feed on the ground because it is easier than clinging to an ear, but they prefer perches nearby for protection and rest. It also helps if you plant succession blocks at opposite sides of the field, not right next door.

*Good insect control will reduce the corn's attraction to birds.* Birds that are attracted to ears by the presence of caterpillars will cause damage to non-infested ears in the block as well. They cause a lot more damage than most insects do.

### **Tools for Repelling Birds**

**Visual Scare Devices.** Eye-spot balloons and reflective mylar ribbons can be effective and fairly economical for small to medium sized fields, especially if combined with other tactics. Many growers are using these silent deterrents and the general feeling is that they are fairly effective, especially when combined with auditory deterrents. Growers report that the following methods make balloons more effective: use at least 8 balloons per acre, place them in the field several days before harvest, and leave the previous block standing, without balloons, to allow birds to feed in older corn.

**Chemical Deterrents.** Bird deterrent sprays (there are several on the market) contain methyl anthranilate, a chemical allowed for use on fruits and vegetables. Methyl anthranilate is also a food additive that imparts a fruity odor to



products. The method of action of methyl anthranilate is that it irritates nerves in birds' bills. Tests of the efficacy of methyl anthranilate products have not produced strong evidence that it deters birds in field situations. If you use sprays containing methyl anthranilate, apply them following the label as closely as possible to increase the likelihood of effectiveness. For example, bird deterrence may be improved if they are applied with foggers, which produce smaller droplets, than typical sprayers. Also, the sprays need to be reapplied after it rains. Repellents are likely to be most effective if combined with other tactics.

### **Auditory Scare Devices:**

- **Exploders** are gas-fired cannons placed in the field that fire automated, timed discharges. These can be quite effective. Cannons are available from some agriculture supply sources. Do check with your farm neighbors and the local police to let them know what you are going to do. Cannons are very loud. Neighbors may complain.
- **Shellcrackers** are 12 gauge shotgun shells in which the lead shot has been replaced with a bulldog firecracker. When fired from a shotgun, this firecracker travels 75 to 150 yards and explodes in the air with a loud report. Use a single shot, inexpensive 12 gauge shotgun as the loads are very corrosive. Firing a few rounds early and late in the day will unsettle birds. Federal permits are not required. Again, notify local police and neighbors to let them know what you are doing. Check on local town ordinances. This method can be satisfying on a short term basis. The disadvantage is that it requires a person to take time in the field to discharge the shellcrackers. For a more detailed fact sheet on shellcrackers and other prevention devices, contact [USDA Wildlife Services](http://www.usda.gov/wildlife-services) (413-253-2403).
- **Distress calls and raptor calls.** Recordings of distress calls or the calls of predatory birds, which repeat at regular or random intervals and operate on battery or solar-power, can be quite effective. Because flocking birds are very responsive to the signals from others in their flock, a distress call from one bird is a sign to all the others that an area is unsafe. These tools have become quite sophisticated, with programmable or random call intervals that help to overcome birds' ability to get used to regular sound intervals. Make sure you are using a distress call that matches the bird species you need to scare away. These can be purchased through many farm and orchard suppliers.

**Interfering with birds' perception of their environments.** Recently developed devices in bird management impair birds' abilities to perceive their environment and may have applicability in fruit production systems. "Sonic nets", for example, are not actually physical nets; they are systems that broadcast noise at the same frequencies at which birds communicate, potentially interfering with birds' ability to warn each other about danger. One test showed that the nets deterred birds from an airfield. By reducing birds' abilities to communicate and perceive predators, these techniques may be less susceptible to habituation than scare techniques. One producer of such devices is at <http://sonicnets.com/>.

**Using falcons.** Even better than recorded raptor calls is the real thing! There are falconer clubs in many areas. Hire a falconer to fly their bird over your field. Nothing will clear out a flock of blackbirds faster than a falcon swooping over the field! American kestrels can also be attracted to some fields with nest boxes. Information about building and maintaining nest boxes can be found [here](#). Kestrels nest in May and June and sometimes July, and they are most likely to be helpful as a bird deterrent if your crop is ripening during those month—these also work well in sweet cherry orchards. The nest boxes can also be attractive to European starlings. If a starling occupies a box, it will add grass and other materials to the box and lay 5 – 7 pale blue eggs. A starling nest should be removed from the box, and new wood shavings added to the box if needed. Starlings are not native to North American and are not protected by the Migratory Bird Treaty Act so no permits are needed to remove their nests. An important consideration is that kestrels eat voles and mice, so rodenticides should not be used in fields when kestrels are present.

**Laser scarecrows and drones** show some promise in reducing bird activity in sweet corn. Laser scarecrows sweep a laser beam over a field. Studies show significant reductions of bird damage but the damage may still be too high for some (about 15% damage, down from 20-50%). For more information including how to purchase a kit to build your own visit <https://sites.google.com/view/urilaserscarecrow/home>. In recent preliminary work with drones in sweet cherry orchards, results were inconsistent but suggest drones may deter birds in some contexts. On some days, in some orchards, fruit-eating bird numbers were lower when drones were flying over a block. Larger-scale trials to investigate this strategy are warranted.

**Netting** is often used in berry or cherry production and is sometimes used by enterprising sweet corn growers too! This was considered the most effective bird deterrent in a survey of 1500 fruit growers (Anderson et al. 2013). Netting requires considerable effort and materials. If one employs netting, it is important that the netting enclose the vulnerable crop completely. That means with sweet corn you will need to cover the block entirely and bury the edges in the

ground. Folks who have been successful using this method in corn recommend setting the nets after sidedressing and leaving extra netting for the crop to push up as it grows. You will need a sturdier netting than that used in fruit settings. On one farm it takes 6 workers 25 minutes per acre to set the nets up but once in place it will protect the crop from birds as well as corn earworm (though not European corn borer or fall armyworm) and so can reduce the number of insecticide sprays needed.

**Sweet corn topping (de-tasseling).** A technique that has been [studied and tested in NY and CT](#) is to ‘top’ the corn. Topping is the removal of the top of the corn plant from just above the silk or top of the ear, after pollen shed and pollination. The advantages may include 1) harvesting 2 to 3 days earlier than un-topped, 2) improved picking ease 3) reduced bird damage, 4) easier to monitor bird activity in the block 5) improved spray coverage and 6) reduced lodging due to wind. One significant risk is that cut stems are sharp and pointed and can cause eye injury to pickers; it’s a good idea for pickers to wear goggles in topped fields. It is important to use equipment that is designed for this purpose to ensure safety; one source for a topper unit is [Haigie](#). As with other methods, topping should be done early, several days before harvest, so the birds are not already feeding in the block.

**Shooting birds.** A federal permit is not required to shoot or otherwise control blackbirds, cowbirds, grackles, crows, or magpies when they are found committing or are about to commit damage to or “depredation upon” agricultural crops. In Massachusetts, state permits are not needed for controlling starlings. State regulations allow hunting of crows any time of year except during the nesting season. For more details contact your MA Division of Fish and Wildlife District Office (western district (413) 684-1646; CT Valley (413) 323-7632; central district (508) 835-3607; northeast (978) 772-2145; southeast (508) 759-3406). From now through the rest of the corn harvest season, no permit should be required to hunt crows. While hunting can reduce numbers over the long term, it may not be effective against flocks of invading birds. It is not illegal to display dead birds in the field, but it is not clear that this is an effective deterrent. For regulations on geese, consult the US Fish and Wildlife service at 413-253-8200.

*--Written by R. Hazzard, updated for 2021 by S.B.Scheufele*

## **NEWS**

### **GUIDANCE FOR FLOOD-AFFECTED FOOD CROPS**

With the excessive amount of rain we’ve received recently, there are many farms that have experienced flooding, particularly in the western end of the state. If your farm is susceptible to flooding, please read the FDA’s **Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption**, found at this link: <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-evaluating-safety-flood-affected-food-crops-human-consumption>

Per the guidance: “If the edible portion of a crop is exposed to flood waters, it is considered adulterated under section 402(a)(4) (21 U.S.C. 342(a)(4)) of the Federal Food, Drug, and Cosmetic Act and should not enter human food channels. There is no practical method of reconditioning the edible portion of a crop that will provide a reasonable assurance of human food safety. Therefore, the FDA recommends that these crops be disposed of in a manner that ensures they are kept separate from crops that have not been flood damaged to avoid adulterating “clean” crops (Ref. 1, 2, 3).”

The guidance also addresses potential microbial, chemical and fungal contamination, the safety of food crops when flood waters did NOT contact the edible portion of the crop, as well as flooding vs. pooled water.

Please contact MDAR’s Produce Safety Division if you have any questions regarding the safety of your crops: Kate Bailey, Produce Safety Inspector, Phone: 857-315-7478, [Kate.Bailey@Mass.Gov](mailto:Kate.Bailey@Mass.Gov)

### **UMASS EXTENSION DIAGNOSTIC LAB NOW ACCEPTING HEMP SAMPLES FROM LICENSED GROWERS**

The UMass Extension Diagnostic Lab is now accepting hemp samples for analysis and evaluation of insect and disease problems. In addition, a special program in 2021 offers only licensed hemp growers the opportunity to have nematode analysis conducted for free, including a site visit!

For both disease diagnostic services and nematode analysis, samples will be accepted only from licensed hemp grow-

ers in Massachusetts. Submission of a copy of the grower's license is required.

For information on collecting, packaging, and shipping hemp samples to the lab, as well as the free nematode analysis program, see the lab's [Hemp Diseases and Nematode Assays](#) page or call Dr. Angela Madeiras at [413-545-3209](tel:413-545-3209).

## **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](https://unh.az1.qualtrics.com/jfe/form/SV_9Ag68WJ1uyjreE6).

## **COMMERCIAL GRAPE GROWERS' SURVEY**

The UMass Extension Fruit Program is conducting a survey of commercial grape growers to gather information on how to better serve this audience. If you are a commercial grape grower in New England or New York, please fill in the survey below. Your response will be used to prioritize future Extension and research efforts. It should take between 5-15 min. The deadline is Friday August 6, 2021.

Completing this survey will automatically enter you into a raffle to win a \$150 gift certificate & a free subscription to the Grape Notes Newsletter.

**Survey link:** [https://umassamherst.co1.qualtrics.com/jfe/form/SV\\_dhz2MMPQdvXYC9g](https://umassamherst.co1.qualtrics.com/jfe/form/SV_dhz2MMPQdvXYC9g)

## **TREE FRUIT & SMALL FRUIT GROWERS: WEEDS NEEDS SURVEY**

Since 2016, the UMass Extension Fruit Program has been operating without an official weeds specialist. The Fruit Team has created this brief survey to assess current weed management challenges in commercial orchard, vineyard and small fruit cropping systems. The results of this survey will be shared but all personal information will be kept confidential.

**Survey link:** <https://forms.gle/4Ty8RS5n1ETXiTEn9>

## **EVENTS**

### **TWILIGHT MEETING: IN-FIELD USE OF UV LIGHT TO REDUCE PLANT DISEASES & MORE**

**When:** Wednesday, August 18, 2021, 3:30-5pm

**Where:** Ward's Berry Farm, 614 South Main St., Sharon, MA 02067

**Registration:** <https://forms.gle/FP1EHZHtTpZgh9tb6>

UV light has been used in several systems including strawberry, squash, and beet to reduce diseases like powdery mildew. In this study funded by the Northeast SARE Novel Approaches for Sustainable Ag, researchers from Mt. Sinai partnered with UMass Extension and Ward's Berry Farm to evaluate efficacy of UV light to reduce downy mildew in cucumbers, a very destructive late-season disease. Jim Ward of Ward's Berry Farm in Sharon, MA worked with the researchers to build a UV-emitting "sprayer" that can be used in the field to combat disease. Nick Skinner of Mt. Sinai will discuss the use of UV light in several disease systems, Jim will share his experience of building and using the UV sprayer, and Sue Scheufele will discuss the cucumber downy mildew experiments conducted in 2020 and 2021.

In addition, Jim will highlight some other experiments happening around the farm, including a pumpkin variety trial, using the UV sprayer on other crops around the farm including for powdery mildew control in zinnias, and describe his ongoing "experiment" with no-till pumpkins.

Lastly, Sue Scheufele and Andy Radin from URI Cooperative Extension will moderate a roundtable discussion of pest and crop issues seen this season.

**Questions?** Contact Sue Scheufele, [sscheufele@umass.edu](mailto:sscheufele@umass.edu)

## ECONOMICS OF WINTER SPINACH PRODUCTION: THREE CASE STUDIES

**When:** Wednesday, September 1, 12-1 pm

**Where:** Zoom

**Registration:** <https://forms.gle/Q89UMus1kWMV2XBq8>

Last winter, the UMass Extension Vegetable Program followed three farms through their winter high tunnel spinach production process, to collect examples of the range of systems of New England winter greens growing. Each farm provided detailed records of spinach inputs, labor, yield, and sales from one high tunnel in order to create an enterprise budget. At this lunchtime Zoom presentation, we will summarize our findings and compare a few key pieces of data from the enterprise budgets. Ryan Karb of Many Hands Farm Corps and Danya Teitelbaum of Queens Greens will join us to answer questions about spinach production on their farms. Join us to hear about these case studies and start thinking about your own winter spinach production goals, techniques, and bottom-lines!

**Questions?** Contact Genevieve Higgins, [ghiggins@umass.edu](mailto:ghiggins@umass.edu)

## **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:**

- [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

## **MASSACHUSETTS TOMATO CONTEST TO BE HELD ON AUGUST 24**

The 36th Massachusetts Tomato Contest will be held in the KITCHEN at the Boston Public Market on Tuesday, August 24. Tomatoes will be judged by a panel of experts on flavor, firmness/slicing quality, exterior color and shape. Always a lively and fun event, the day is designed to increase awareness of locally grown produce.

Farmers who want to submit entries can bring tomatoes to the market between 8:45 am and 10:45 am on August 24th or drop their entries off with a registration form to one of the regional drop off locations on Monday, August 23rd. Drop off locations include sites in Great Barrington, South Deerfield, Worcester, Dighton and West Newbury. These tomatoes will be brought in to Boston on Tuesday.

For complete details, including drop off locations, contest criteria, and a registration form, [click here](#). Be sure to include this [registration form](#) with your entries.

The 36<sup>th</sup> Tomato Contest is sponsored by the Massachusetts Department of Agricultural Resources, New England Vegetable and Berry Growers Association and Mass Farmers Markets in cooperation with the Boston Public Market.

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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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