



UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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IN THIS ISSUE:

- Crop Conditions
- Pest Alerts
- Cercospora Leaf Spot
- Late Season Cover Crops
- Whacking Weeds in Wet Weather
- Events
- Sponsors

CROP CONDITIONS

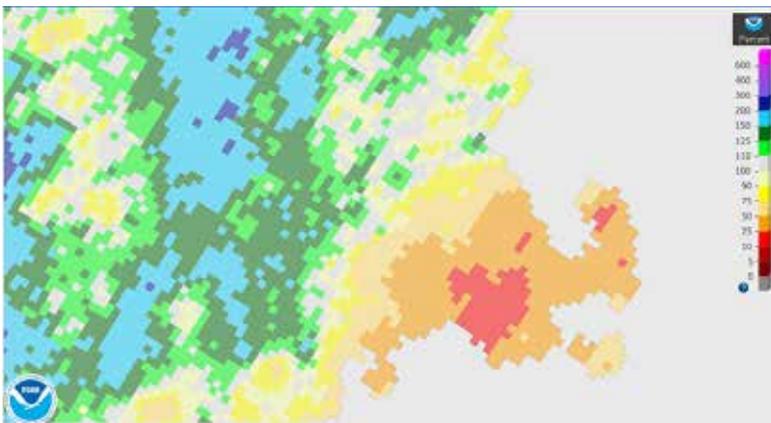
Do you follow the 20% rule when planning for harvest by planting 20% more seed than you need, based on expected yields? One farmer says he plants twice as much of a crop than what it is expected to yield. He says this is especially important when selling wholesale and you need high quality produce for your markets. So what do you do with perfectly good excess? One program in PA advertises an “Ugly CSA” for \$25/week to sell this secondary produce. The UMass Student Farm and Vegetable Extension Program have donated over 20,000 lbs to the Food Bank of Western MA and local food pantries this year so far. Based on feedback from the pantries, we have heard that this is a bumper year for cucumbers and squash, but a tough year for broccoli and cauliflower.

Growers in the Pioneer Valley of MA complain that this is their worst year in a long time, due to the onslaught of rain in August. There has been 12” of rain in South Deerfield and 17” in Conway, MA (150% of normal rainfall), and it isn’t even hurricane season yet! Meanwhile, southeastern MA is still abnormally dry (25% of normal rainfall). The dry May and June followed by wet weather explains how weeds got out of control this year. See the article “Whack Out Weeds in Wet Weather” in this issue for more information.

Excess rain can also lead to reduced fungicide efficacy, as they are quickly washed off. Here are some tips from Meg McGrath, Plant Pathologist at the Long Island Horticultural Research & Extension Center: “Most fungicides do not have curative activity, and for those that do, it is very limited. Crops with no to few symptoms are the most important to protect with fungicide applications. Rainfastness of fungicides is important to consider for applications made before rain, to help with deciding what products to apply when rain is imminent and when to make the next application. All fungicides need time to at least dry before rain. Protectants like chlorothalonil, mancozeb, copper, and many organic products remain on the surface of leaves. Stickers in the formulation or included with the application will help keep them on leaves, but an intense rainfall or 2 inches of rain will remove most residue. Most modern, single site mode of action fungicides move into leaves. Those that are lipophilic can move into leaves quickly. Sometimes, time for rainfastness is included on the label. It is only 30 minutes for Orondis.”



Problems with erosion and mud this season? Come to our Reduced Tillage and Transplanters for Vegetable Farmers Twilight Meeting on Tuesday August 28th, 4-7pm. Register [here](#). New to the agenda: Skip Paul of Wishing Stone Farm in RI with his new Inter-Seeder! Check out a video about this piece of equipment [here](#).



Precipitation for July 2018

PEST ALERTS

Alliums

[Onion maggots](#) destroyed about 10% of a hilled leek crop in Berkshire Co., MA this week. Adults can travel ½ to 1 mile in search of a host. Female flies lay eggs at the base of the stem. Cool, moist soil conditions favor survival of the eggs, and soil temperatures over 95°F kill them. We have just passed the peak flight of the second generation in most parts of the state, according to the [NEWA Onion Maggot Model](#), but it is still occurring in the cooler Berkshires. While it has been a fairly hot and wet summer, growing degree days in the Berkshires are lower than other parts of the state.

Brassicas

[Fusarium wilt](#) was diagnosed in a kale crop in Franklin Co., MA this week. Leaves were yellow and curved to one side, and hyphae were observed in the discolored vascular system. The pathogen prefers temperatures between 80 and 90°F for growth and is inhibited above 95°F. This pathogen is not easy to manage once present on a farm because it produces long-lasting resting spores. Growing resistant varieties is the best management option. Some resistant varieties will succumb to disease if temperatures exceed 77°F. Siberian kale is considered resistant.



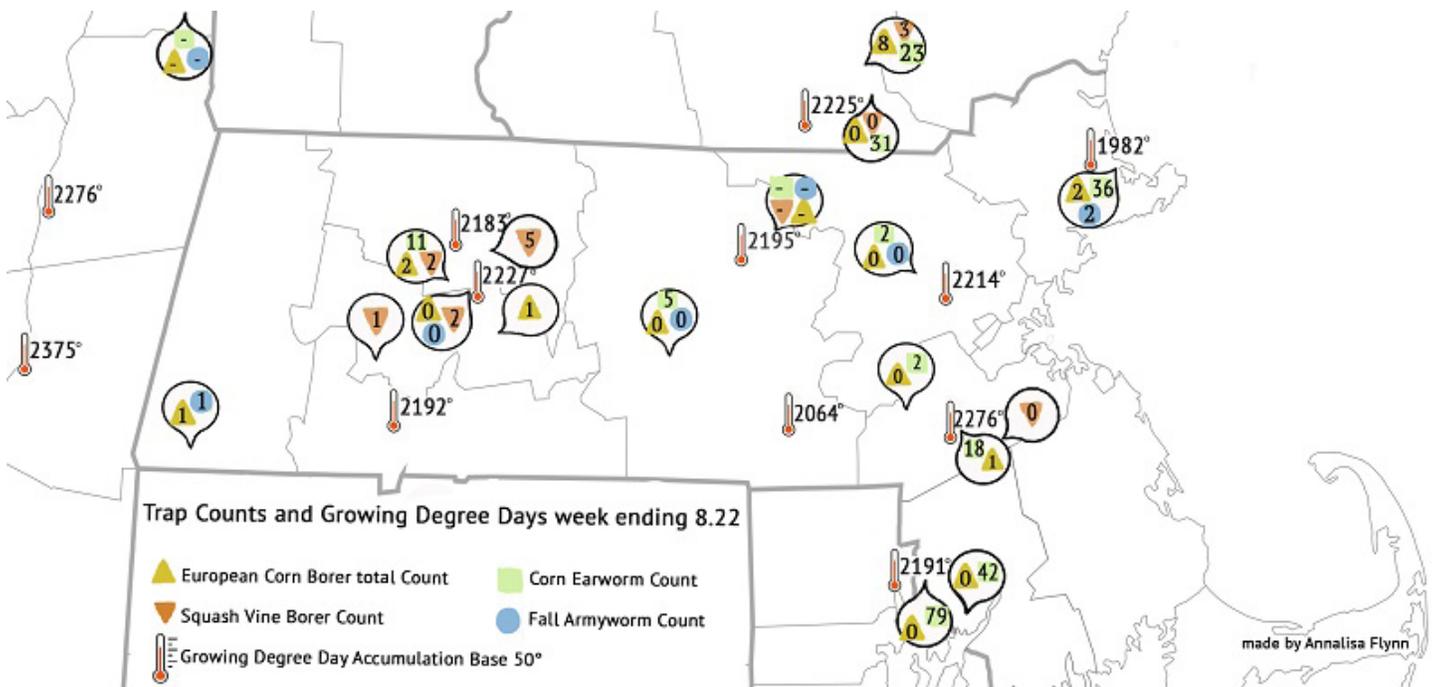
Fusarium wilt of kale. Discolored vascular tissue (above) and distorted, yellow leaves (below). Photos: A. Madeiras

Cucurbits

[Downy mildew](#) was found on butternut and delicata winter squash in Franklin Co., MA this week. Multiple cucurbits are now at risk, and growers should be spraying protectively. Downy mildew is not yet confirmed in ME, NH, or VT. In NH, pumpkin fields have been reported to be going down quickly, but only due to [powdery mildew](#) so far. When controlling either disease at this point, use systemic fungicides, especially in areas where we have had heavy rains. Two inches of rain will wash off most protectant fungicides like chlorothalonil or copper.

[Squash vine borer](#) (SVB): We may be seeing the beginning of a second flight for SVB in MA at this time. Trap counts are up in locations across the state compared with last week (see map). The second generation can infest fruit of winter squash and pumpkins. The treatment threshold is 5 moths per week in the pheromone trap on bush varieties and 12 moths per week on vining varieties.

Sweet Corn



[Birds](#) – mostly starlings and blackbirds – have reportedly left the fields on one farm in Berkshire Co., MA. Where did they go? New Hampshire and Vermont Extension Educators are seeing them in fall berries and grapes now as growers are covering those crops with bird netting.

[Corn earworm](#) (CEW) trap captures remain high around the state and continue to drive the spray schedules for sweet corn. [European corn borer](#) (ECB) and [fall armyworm](#) (FAW) trap captures remain low. FAW is just starting to arrive in the state. In some locations where there was a second generation of ECB, we are seeing a few caterpillars and a small amount of feeding damage now.

CERCOSPORA LEAF SPOT OF SWISS CHARD, BEETS, AND SPINACH

Cercospora leaf spot, caused by the fungus *Cercospora beticola*, occurs wherever table beets, Swiss chard, sugar beets, or spinach are grown, and is one of the most important diseases affecting the chenopods. It can result in significant losses, particularly in late summer when conditions are favorable (high temperatures, high humidity, and long leaf wetness periods at night) and inoculum builds up. Leafy greens become unmarketable, and beet roots fail to grow to full size when disease is severe.

Identification

Initial symptoms occur as numerous, small, circular leaf spots with a pale brown to off-white center and a purple-red margin. Lesions expand in size, coalesce, and turn gray as the fungus sporulates, and can result in extensive loss of foliage. Younger leaves at the center of the plant are often less severely affected. The pathogen produces sclerotia or stromata which can be seen with a hand lens as small, black dots in the center of lesions. Lesions may also occur on petioles, flower bracts, seed pods, and seeds. Leaf symptoms are similar to those caused by Phoma leaf spot (caused by *Phoma betae*), except that Phoma will have more obvious tiny fruiting bodies in the lesions and can also affect the roots.



Cercospora leaf spots on beet greens.

Source and survival

C. beticola survives between crop cycles in residues from infected crops, in weed hosts, and on seed. It can survive in the soil for up to three years. High levels of disease can result from just a few infected plants, since each lesion produces many spores. Several cycles of infection and spore production may occur with favorable environmental conditions, including high relative humidity, temperatures between 75-85°F, and long periods of leaf wetness (e.g. overnight dew). The spores are then spread by rain splash, wind, irrigation water, insects, workers, and equipment. Successions planted close together can allow disease to move from one planting into the next, and weed hosts can provide green bridges between crops.

Cultural management

- Bury infected crop residues promptly after harvest
- Practice a 3 year rotation
- Control weed hosts, especially lambsquarters.
- Start with certified, disease-free seed or treat seed with hot water or fungicides
- Avoid planting succession crops close together
- Avoid overhead irrigation, or use overhead irrigation only during mid-day when leaves will dry fully, or use drip irrigation

Chemical controls

There are actually many products, both conventional and organic, that are effective in controlling Cercospora leaf spot and other foliar diseases of beets. For optimum results use protectant fungicides preventively, before disease symptoms become severe. Resistance to some fungicide groups is a concern, and the Group 11 fungicides (e.g. Quadris, Cabrio, Flint etc.) are no longer recommended in NY where resistance is well-documented, or in any fields where those products

have been used repeatedly to control this disease. Other conventional products include Tilt (group 3), Fontelis (group 7), Merivon (group 7+11). Dr. Sarah Pethybridge at Cornell University has been doing research on alternative controls for *Cercospora* and has evaluated conventional and organic fungicides and studied varietal differences in resistance. Here are some of her take-home messages:

- Use the highest labeled rate of any product for control of *Cercospora* leaf spot.
- For conventional production, Tilt (4oz/A) was the most effective fungicide she tested. She recommends that Tilt be used first in a spray program for best efficacy. It should then be rotated with other fungicide groups, but can be used again later in the program.
- If bacterial leaf spot is also present, copper should be mixed with Tilt or another fungicide.
- For organic production, a tank mix of Double Nickel and a copper product (she used Cueva) can reduce incidence of *Cercospora* and bacterial leaf spot by 30-40%.
- Heavy weed pressure doubled the incidence of disease, whether or not they were also sprayed with copper. Weeds prevent leaf drying and prevent the fungicide from getting to the leaf!

--Written by Bess Dicklow, Rob Wick and Ruth Hazzard, UMass Extension. Updated by S.B. Scheufele, 2018

LLATE SEASON COVER CROPS

A well-established late season cover crop increases organic matter, improves soil structure, scavenges remaining nutrients, chokes out weeds, and prevents 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! Play with seeding dates on your farm this year; hopefully you will succeed in getting some ground cover. Below is a list of several good choices for this time of year, 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 removal of a seasonal crop and 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.

Annual or italian ryegrass (*Lolium multiflorum*) and perennial ryegrass (*Lolium perenne*) are gaining popularity with some growers as commercial varieties such as 'Fria Annual Rye' are becoming more available and because of the dense root system that outcompetes weeds, protects against erosion, and is 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 though they may not germinate very well under droughty conditions. These cover crops should be planted 6-8 weeks before the fall frost date. The seed is small and light, so specialized equipment such as a Brillion seeder will be needed if seeding 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 15th 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. 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 15th. 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 15th, similar to winter rye. Unlike winter rye, oats will winterkill in Massachusetts, making for simpler field preparation in the spring. However, oats have less organic matter contribution and weed control. 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.

Legumes are a good choice if you are interested in adding nitrogen to the soil, however, it is important to inoculate seed before planting 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 and plant while still wet to keep the bacteria alive. Bacterial inoculants are 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!

Hairy vetch (*Vicia villosa*) usually benefits from being grown with a nurse crop such as rye, oats or wheat to help reduce matting during spring and to keep weeds down. The vetch and the grain can be mixed together in the seed drill or broadcast. Adding vetch to a cover 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 self-seeded vetch. 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 or 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 undersown in mid-summer into corn or winter squash before it vines, and into other crops such as fall brassicas if soil moisture is plentiful. **Seeding rate:** 10-15 lbs/A broadcast; 6-15 lbs/A drilled; 6-10 lbs/A mixed with a grass.

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 at late bloom stage for no-till situations in the spring. **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 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 may be used as cover crops for pest management or in the case of the tillage radish, for improving water drainage and soil structure. Mustards and radishes should not be planted successionaly with any brassica crops since they are in the same family and are susceptible to the same pests.

Tillage radish (*Raphanus sativus*), also known as Daikon, forage, or oilseed radish are appropriate biological subsoilers, often producing 8-14 inch tap roots. 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 it's harvested N by May, unless seeded with a grass such as oats. Higher seed-

ing 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) add irrigation to enhance fumigation or incorporate before rain. Plant this in late-August through September. Other 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.



In one trial, a grower planted a mixture of 6lbs/A Fria rye, 4lbs/A crimson clover and 10lbs/A radish (2). The radish is a highly effective weed killer when seeded at this rate and smothered out the weeds and the other cover crops entirely! Adjacent Fria rye and crimson clover seeded alone survived the winter (4). Compare this treatment to 70lbs/A winter rye and 25lbs/A vetch (1) and no cover crop (3) (see the weeds!?).

Photo: K. Campbell-Nelson, April 21, 2017.

Keep in mind it is always best to plant a cover crop, regardless of the type, as leaving a field bare over 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:

- [A Comprehensive Guide to Cover Crop Species used in the Northeast United States](#). Prepared by: Shawna Clark.
- [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, CU. Reviewed by Julie Fine, 2016.

WHACK OUT WEEDS IN WET WEATHER

One grower made an observation about weed management this year: he says that his early season cucurbit crops planted on heavy soils did well because the ground was moist and seeds germinated in an otherwise dry May. The ground remained moist in these fields and pre-emergent herbicides were also effective. However, crops seeded into lighter soils did not germinate well, herbicides did not have enough moisture to reach the germination zone of the weeds, and eventually weeds took over the poorly germinated crops when rains arrived in July and never stopped.

Herbicide: When it comes to weed management, excess water is more of a problem than too little water. For those using preemergence herbicides, rain or overhead irrigation allows herbicides to be activated where weeds are germinating in the top few inches of soil. Excess rain can move the herbicide below that zone and control will be reduced. When weeds emerge after the crop is up there are a few options left. Check the [New England Vegetable Management Guide](#) for post-emergence herbicide options for specific crops. As with cultivation, small weeds die easier and faster, so do not delay if you have a window to apply a postemergence herbicide. Just about every crop has a postemergence grass herbicide option available. Depending on the crop, these products include Poast (sethoxydoim), Fusilade (fluazifop), Select (clethodim), Assure (quizalofop), and for sweet corn only, Accent Q (nicosulfuron). Grass herbicides work best on actively growing grasses BEFORE they flower and make seeds. Depending on the crop, broadleaf weed options may include nonselective herbicides (which will work on all plants, including the crop) like carfentrazone (Aim) and glyphosate (Roundup), as well as more selective herbicides (which will work on weeds and are safe on crops) like clopyralid (Stinger), halosulfuron (Sanda) and topramezone (Impact). Some herbicides are labeled for use on the crop, while others are only labeled for use

between rows. Make sure to read the label carefully before using any product. Keep in mind that postemergence herbicides work best if weeds are small (1-3”), and many should only be used after the crop reaches a certain growth stage.

Cultivate whenever it is dry and sunny; take advantage of those few days and don’t delay. Weeds die better when they are small. Remember not to cultivate too deeply. Deep cultivation destroys crop roots and brings new weed seeds closer to the soil surface.

Hand weeding is always an option, but take care not to drop those weeds back onto the soil where they might take root again. Consider using buckets or a wheelbarrow to remove the weeds from the field. Pigweed, lambsquarter, and ragweed are all in bloom now and it is a good time to kill these weeds before they go to seed. Flowering galinsoga will produce seed if left in the field even after you pull it, so be careful to remove these from the field. When pulling weeds in the holes on plastic mulch, have employees shake the weeds to remove excess soil and then place the weeds on the plastic where they have a much greater chance of dying.

There is another option for managing weeds at this time of year—mowing and burning! The following is from the article [When the Time Comes to Hand Pull Weeds](#), from the USDA-ARS Integrated Weed Management Resource Center:

Mowing: “[An option] for late-season management is to mow the area of the field that contains a severe infestation. If the weeds have not yet produced seeds, this should substantially decrease the quantity of dropped seeds. The grower would need to weigh the cost of terminating the crop where the infestation exists, but should keep in mind that preventing this weed infestation now can save a substantial amount of money on weed control next year.

Burn! When faced with a severe, mature infestation that has produced seeds, a grower may choose to not only mow the affected section of the field, but also burn the mowed weeds in piles or windrows. Burning this weedy plant matter at sufficiently high temperatures kills the weed seeds. Temperatures of 800-900°F are required to kill most weed seeds. In order to achieve this temperature range, it is important to form the plant matter in windrows or piles and then wait for it to dry, in order to create the density and dryness needed. Windrows may also be formed at harvest-time and then burned—this technique is referred to as “[narrow windrow burning](#)”. It is becoming widely adopted in Australia, and is being tested by Virginia Tech and the University of Arkansas for use in US cropping systems.

While late-season control measures are labor-intensive, eliminating escaped weeds is an important measure for preventing seed dispersal and new infestations, especially in no-till fields. Just a few plants can produce enough to infest an entire field in a couple of seasons. Manual removal this year could save significant money, time, and labor in future years.”

Good luck and stay dry.

--Written by Rich Bonanno. Updated by Katie Ghantous and Katie Campbell-Nelson, 2018

EVENTS

Reduced Tillage and Transplanters for Vegetable Farmers

Featuring: Farmer Jim Ward and his reduced till vegetable cropping systems which he has practiced for over 10 years with the help of an Unverferth Deep Zone Tiller, Davidian Farm’s two-row Monosem vacuum precision planter mounted with Dawn Biologic roller crimpers (first ones in the state!), the UMass Research Farm’s grain drill and roller crimper, Brookdale Fruit Farm’s new line of no-till transplanters from Checchi-Magli, and Skip Paul of Wishing Stone Farm in RI with his InterSeeder. There will also be demonstrations on Soil Health with Maggie Payne, Soil Scientist at NRCS.

When: Tuesday, August 28th, 2018 from 4:00 PM to 7:00 PM

Where: Ward’s Berry Farm, 614 S Main St., Sharon, MA 02067

CLICK HERE TO REGISTER: <https://www.surveymonkey.com/r/XF8JOYD>

[Click here to request special accommodations for this event.](#)

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Vegetable Notes. Katie Campbell-Nelson, Genevieve Higgins, Lisa McKeag, Susan Scheufele, co-editors.

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