UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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Michele Meder and Genevieve Higgins planting broccoli at the research farm in between downpours
Photo: S. Scheufele

Crop conditions

While plants seem to be managing the heat mostly in stride, us humans are beginning to struggle with the relentless heat and humidity. Unpredictable showers and thunderstorms make planning crew activities more challenging, and while these storms may bring a moment's break from the heat, they tend to bring little if any accumulation of rainfall and seem only to increase the humidity. Always optimistic, you growers break out the popsicles and keep on going! Pumping out loads of squash, hauling in cabbages and cucumbers, bunching fresh onions and digging up new potatoes. Those with small fruits are opening up pick-your-own blueberries and raspberries this week, keeping market shelves diverse and customers happy!

We did see some heat-related issues in plants this week—salad greens getting toasted in the field before harvest, transplant shock in brassicas and cucumbers, and sunburn of basil. Most of the state is still considered "abnormally dry" by the US drought monitor. Growers are struggling to keep tender crops cool without overwatering in hot, humid conditions. We took a cue from one of you progressive growers and planted cucumbers last week into white instead of black plastic, and I'm sure glad we did—the plants had very few signs of heat-related wilting or scalding since the white mulch reflects more heat and plants stay cooler.

Pest alerts

Alliums:

Onion thrips populations are increasing across the region. Continue to manage these pests and to water regularly to produce the best quality bulbs.

Garlic anthracnose was diagnosed this week in Duke's Co., MA. This fungal disease affects the scapes, producing sunken tan to orange lesions that cause the scapes to twist and bend. The disease renders scapes unmarketable but it is not known if it affects garlic bulb yield. The pathogen has a wide host range including small fruit and pome fruit.

Brassicas:

Imported cabbageworm and diamondback moth eggs and caterpillars are being found in greater numbers now. Thresholds for spraying are 15% or 35% in leafy or heading crops, respectively.

Cross-striped cabbageworm has been observed in CT. This caterpillar pest is more damaging than others because it lays eggs in clusters of 3 to 25, rather than singly, so when the eggs hatch, plants are quickly skeletonized by a group of caterpillars. The caterpillars are light bluish-grey on top and green underneath, with

Cross-striped cabbageworm
Photo: Clemson University

numerous black bands across their backs and a yellow line down each side. The same controls work for these as other caterpillars – see the New England Vegetable Management Guide for recommendations.

Cabbage aphids arrived in the region early this year and numbers are already high. Regular spraying is necessary in sensitive crops, e.g. Brussels sprouts, broccoli, and kale, in order to prevent aphid populations from exploding.

Chenopods:

Leaf Miner: Adult flight and egg-laying continues across the state, with some fields hit pretty hard this year. For organic growers, remember to follow labels for resistance management issues. From the Entrust SC label: "Do not make more than two consecutive applications of Group 5 insecticides (spinetoram and spinosad). If additional treatments are required after two consecutive applications of Group 5 insecticides, rotate to another class of effective insecticides for at least one application." Including a spreader/sticker in your spray can increase efficacy of Entrust and contribute to smothering of eggs.

Cucurbits:

Striped cucumber beetle feeding damage is on the rise and signs of bacterial wilt (see photo), vectored by these beetles, may be seen now in sensitive crops. If a sudden wilt with no associated yellowing occurs in cucumbers and cantaloupes, bacterial wilt may be the culprit.

Characteristic symptoms of bacterial wilt, which is vectored by striped cucumber beetle. Photo: UMass Extension

Squash bug eggs and adults are being seen in fields we have scouted this week, but nymphs haven't been seen yet. For control options please see the New England Vegetable Management Guide.

Squash vine borer: Adult flight is picking up this week, with trap captures ranging from 10-46 moths/week. A few eggs were seen at the base of squash and pumpkin plants but no damage has been observed yet. Infested plants will wilt suddenly and vines will collapse when larvae burrow into stems and cut off the flow of water and nutrients to the plant.

Cucurbit downy mildew was confirmed in New Jersey on cucumber this week. This is the nearest outbreak so far this year but risk for disease spread to New England is low at this time.

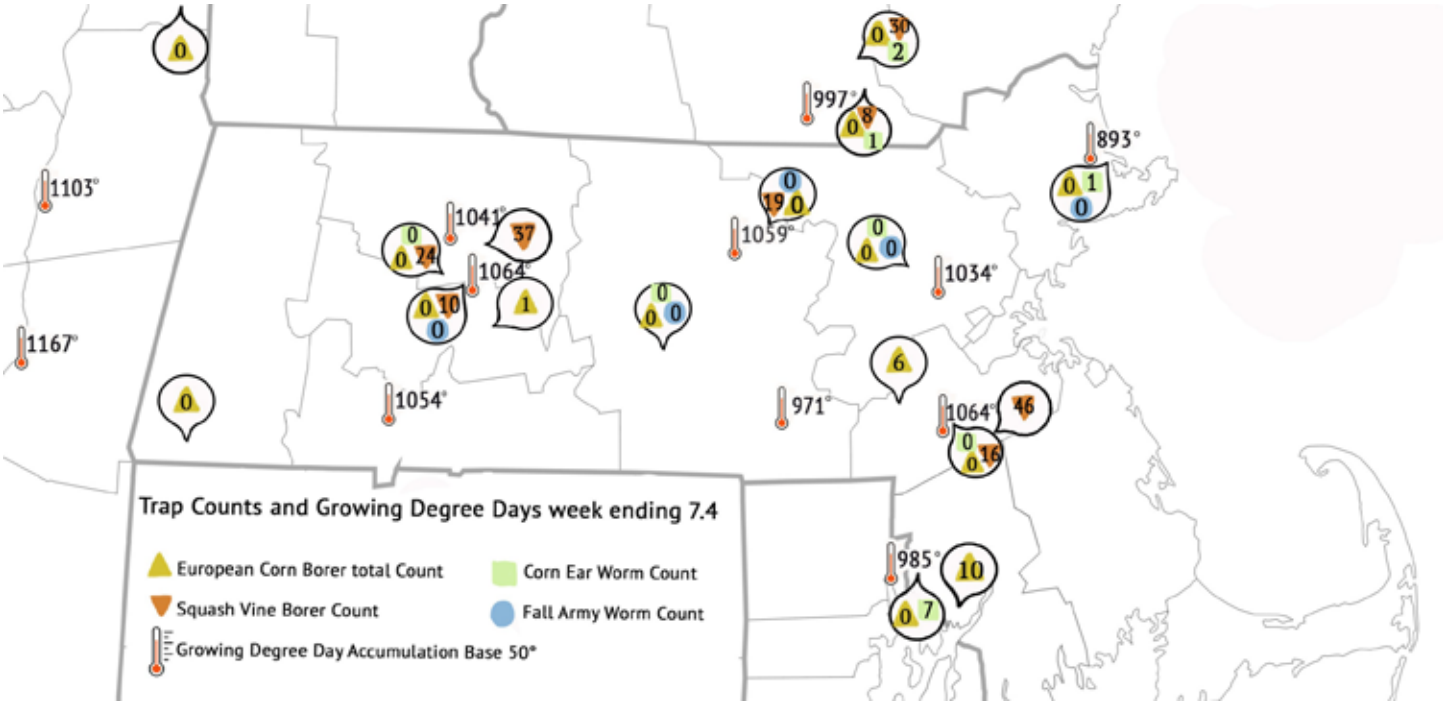
Solanaceous:

No new late blight reports in the Northeast this week.

Thrips damage was diagnosed on greenhouse tomatoes in CT this week. Feeding damage on foliage appears as light silvery flecking on leaves, the older leaves were worst affected.

Verticillium wilt was diagnosed on eggplant this week. Verticillium wilt is caused by two soil-dwelling fungi and has a wide host range, including many vegetable and ornamental crops and weed hosts as well. The fungi survive for long periods of time in the soil and on infested crop residue as microsclerotia or mycelium, and in weed hosts. Infection occurs through wounds in the roots caused by cultivation, secondary root formation, or plant-parasitic nematode feeding. The disease is favored by cool weather and neutral to alkaline soils. There is no treatment for plants once infected and fungicides are not effective. Therefore, good cultural practices including good weed control, maintaining crop vigor by irrigating and fertilizing appropriately, sanitizing tools, minimizing movement of infested soil, and practicing long rotations are key tactics for control of Verticillium wilt. The following vegetable crops are resistant or immune to Verticillium: asparagus, bean, carrot, celery, lettuce, pea, and sweet potato.

Potato leafhoppers are still present in high numbers and we are seeing more severe and widespread signs of hopperburn in potatoes and beans this week. For organic and conventional control options please see the New England Vegetable Management Guide.



Sweet Corn:

European corn borer: Sites in our monitoring network captured 0-10 ECB this week, about the same as last week. The first of the corn earworm moths are starting to be captured now, with 0-7 moths per week—see table for spray intervals for CEW. There are still no reports of fall armyworm or western bean cutworm in MA.

Spray Intervals for Corn Earworm based on moth captures in Heliothis net traps.

Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	no spray
0.2 -0.5	1.4 - 3.5	6 days
0.5 - 1	3.5 – 7	5 days
1 - 13	7 – 91	4 days
Over 13	Over 91	3 days

Other crops:

Mexican bean beetle adults were found this week but no eggs or larvae. These beetles overwinter in field edges and are emerging now, so if you had problems with MBB last year and were not able to rotate your beans, you can expect them to come back this year. A great way to control MBB in unsprayed PYO fields is using the biocontrol organism Pediobius foveolatus. Order these parasitic wasps once you see egg hatch beginning. See this factsheet for more details.

HOPS DOWNY MILDEW - AN OLD FOE RETURNS

Hops (*Humulus lupulus*) may seem to be a new crop in the Northeast, but in fact it is not. The first commercial hops producer in the United States was established in Massachusetts in 1648, and our humble state remained the largest producer of hops in the country until New York moved into the lead in the mid-1800s. The hops industry in the Northeast continued to grow until 1909, when an epidemic of powdery mildew devastated the industry. The advent of sulfur-based fungicides around 1920 seemed like the answer to growers' prayers, but the relief proved to be short-lived. A downy mildew epidemic soon appeared and combined forces with Prohibition to end the hops industry in the Northeast by 1930. Production moved to the drier regions of the Northwest, where it has largely remained; today, 75% of commercial hops are grown in Washington State, with Idaho and Oregon combining for 24%.

Front (left) and back (right) of hops leaf infected with downy mildew. Photos: Erin Lizotte, MSU Extension

The American hops industry enjoyed a homecoming of sorts early in the 21st century, when the growing popularity of small breweries and demand for locally grown ingredients led to renewed interest in hops production in the Northeast. According to the recent statistical report published by the Hop Growers of America, production in New York and New England grew from zero acres in 2013 to 501 acres in 2017. Unfortunately, downy mildew of hops has also made a comeback in that short time.

The oomycete pathogen that causes hops downy mildew. Photo: A. Madeiras, UMass

Downy mildew of hops is caused by the oomycete *Pseudoperonospora humuli*. It also infects *Humulus japonicus* (AKA wild hops, which was imported from Asia in the 1800s and became an invasive weed in eastern North America), and *H. americanus* (AKA *Humulus lupulus* var. *lupuloides*). It may also infect some nettles (*Urtica* species). *P. humuli* causes both localized and systemic infections, and may overwinter in crowns and buds. In spring, infected crowns produce distinctive shoots known as primary spikes (see photo at right) which may be stunted, yellowed, and have shortened internodes. The leaves may curl downward and turn brown. In cool, wet conditions, purplish-gray sporangia are produced on the undersides of infected leaves. Sporulation occurs when nighttime temperatures are above 41°F; the optimum range is 60-68°F. Humidity levels >70% are required for sporulation, and free moisture on plant surfaces is required for infection to occur. Sporangia are produced in the morning and spread by wind and rain splash to other plants. Infection can occur on wet leaves within 2 hours at 59-84°F. It may also occur at temperatures as low as 41°F if leaves remain wet for 24 hours or more. Leaf infections produce brown, angular lesions. *P. humuli* may also produce oospores in infected leaves, stems, and cones. Oospores are tough-walled structures that may enable the pathogen to survive in soil.

Primary or basal spikes produced by a systemically infected hops plant in the spring. Photo: OMAFRA Hort Matters

Infected shoots produced by apical meristems are called secondary spikes and resemble primary spikes above the point at which infection occurred. Infection of the apical meristem requires 3-6 hours of leaf wetness and occurs at temperatures of 46-73°F. If *P. humuli* finds its way into the apical meristem, the pathogen becomes systemic, growing down the stem through the vascular system and into the crown, where it can overwinter. A reddish brown discoloration may be visible in crown tissue just below the bark; this should not be confused with the red color found in the centers of healthy crowns of some hops cultivars.

Infection may not kill the plant but it will weaken it. This reduces yield and quality of the cones and the winter hardiness of the plant.

Good cultural practices are essential for successful management of hops downy mildew.

- Grow cultivars that have resistance to downy mildew. No cultivar is completely immune to the disease, but many have partial resistance. These include Cascade, Chinook, Willamette, and Newport. Avoid highly susceptible cultivars such as Nugget, Cluster, and Centennial.
- Start with disease-free plants.
- Reduce humidity in any way possible. Plant in areas with good air flow. If possible, orient rows in the direction of prevailing winds. Mow aisles between rows and manage weeds. Use appropriate spacing between plants and between rows. Avoid overhead irrigation.
- Infected buds may be removed from established plants by crowning (removing top 1-2” of crown prior to bud break) or scratching (removing buds from crowns 1-2” below soil surface).
- Scout regularly for symptoms. Remove infected spikes as they appear throughout the season.
- Remove any plants that are severely diseased.
- “Hill up” soil over crowns after pruning- this encourages root growth and buries diseased shoots.
- Remove crop debris from the hopyard.

- Harvest at the right time. Prune as late as possible, but not so late that it will decrease yield.

Chemical management:

- Forecasting tools for hops downy mildew exist in the Northwest, but a similar tool has not yet been developed for the Northeast. The Network for Environment and Weather Applications (NEWA) does have a forecasting tool for grape downy mildew that hops growers might use to gain some idea of when conditions may be right for *P. humuli*. See resources below for link.
- Preventive fungicide applications. Preventive applications are preferable, because fungicides have very limited curative capacity.
- Resistance to metalaxyl and fosetyl-Al have been reported in other hops growing regions of the U.S. Employ other active ingredients in areas where downy mildew appears to be insensitive.
- Other fungicides labeled for hops downy mildew include copper, cyazofamid, cymoxanil, phosphorus acids, dimethomorph, and mandipropamid. Rotate active ingredients to deter resistance development.
- Post-harvest sprays are not recommended. If the pathogen has reached the crown, only fungicides that move down through the phloem (basipetal action) would have any effect. The only fungicides with this type of action are fosetyl-aluminum and phosphorus acids. There is currently no evidence that post-harvest sprays are effective.

Resources:

University of Vermont Fact sheet: http://www.uvm.edu/extension/cropsoil/wp-content/uploads/DownyMildew.pdf

Guidelines for Integrated Pest Management for Hops in Connecticut. CAES Bulletin 1050, 8/17. http://www.ct.gov/caes/lib/caes/documents/publications/bulletins/ipm_of_hops_in_ct1.pdf

Northeast Hop Alliance: https://www.northeasthopalliance.org/

National Clean Plant Network: http://nationalcleanplantnetwork.org/

Hop Growers of America: https://www.usahops.org/

The Network for Environment and Weather Applications (NEWA): http://newa.cornell.edu/index.php?page=grape-diseases

UVM Hops Production Program: http://www.uvm.edu/extension/cropsoil/hops

--by Angela Madeiras, UMass Plant Disease Diagnostic Lab

INNOVATION IN SMALL SCALE VEGETABLE WASHING EQUIPMENT: THE AZS RINSE CONVEYOR

--by Andrew Chamberlin, UVM Extension, Agricultural Engineering Technician

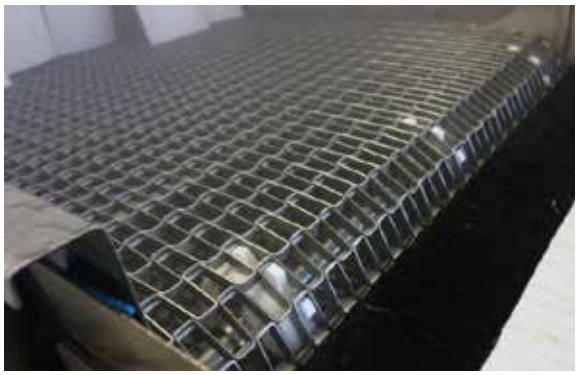
What's new in Ag tech? Well, one thing that we've recently discovered is a rinse conveyor. Specifically designed for the small-scale farm who wants to graduate from hand washing to something a little more automated that can really crank up the pounds of washed vegetables for market.

This machine is made by AZS, an equipment manufacturing company in Ephrata, PA. It is available in full stainless steel, with adjustable water pressure and belt speed, available for under $7,000.

The rinse conveyor is a versatile machine and can wash everything from greens to root crops. I watched it effectively clean sweet potatoes and carrots, but this machine is capable of washing loose spinach and even bunched vegetables or your harvest bins.

The AZS Rinse Conveyor. Photo: A. Chamberlin

A few examples of crops that can be washed on it include carrots, parsnips, kale, spinach, sweet potatoes, winter radish, turnips, beets, and Jerusalem artichoke.



The stainless steel conveyor belt. Photo: A. Chamberlin

Here is how it works:

1. Products get loaded in a single layer onto the stainless conveyor belt and enter the washer.
2. LOW Pressure, HIGH Volume pre-soaking rinse – much like a shower, soaking everything on the line, loosening dried-on debris
3. Next a HIGH Pressure, LOW Volume spray. There are spray bars both above and below the products to blast the grime from both sides. The angle of the nozzles can be adjusted changing how fast the spray bars spin. The pressure can also be adjusted depending on your crop's needs. A sweet potato can take a lot more pressure than spinach leaves.
4. Finally, the product passes through a final rinse from some stationary nozzles mounted above.

Loading the front end of the line
Photo: A. Chamberlin

High-volume pre-soak
Photo: A. Chamberlin

Looking inside at the spinning sprayer bar
Photo: A. Chamberlin

End of the line sorting
Photo: A. Chamberlin

The product then gets to the end of the line and dumps on or in whatever you wish, commonly a sorting table.

This machine is easy to clean and sanitize with smooth stainless finish and minimal nooks and crannies. There is one brush at the end of the line to roll the cleaned vegetables gently off the line. I suspect this brush and the belt will remain pretty clean due to the fact that the belt is constantly being sprayed with water and the brush only touches cleaned crops. With smooth surfaces and easy access this piece of equipment looks like a good improvement in the eye of food safety and wash line equipment.

The basin that collects the wash water does get recirculated. The wash water passes through a series of screens and baffles to settle out the sediment and debris before it goes back through the pump that supplies the pre-soaking, high volume/

Hinged and lifted via pneumatic cylinders to make cleaning access easy!
Photo: A. Chamberlin

The first collection screen
Photo: A. Chamberlin

The type pf debris that collects on the screen
Photo: A. Chamberlin

low-pressure step. As with any post-harvest ag water, this would need to be monitored and treated in accordance with SOP's. The high pressure and the final rinse steps are supplied with fresh incoming water.

These pictures are from a visit to David Paulk's from Sassafras Creek Farm in Leonardtown, MD. David just started using this machine at the beginning of the year. So far he likes it a lot and is looking forward to really dialing in the optimum settings for the fastest washing of a variety of crops. If you missed it, check out the blog post from that visit on the UVM Ag Engineering blog. David gave me a walk-through of how the machine runs and shared his opinions on it. He noted, "I do like the versatility of the AZS. Next to a new pack shed and walk-in coolers I think it's one of the best labor saving tools we've bought. Especially if the farm wants to increase bulk storage crop production for small-scale diversity."

We also reached out to Will Reed from Native Son Farm in Tupelo, MS who purchased the same unit in December. His thoughts on the unit are shared in another blog post. Will was just getting started using the equipment when I talked with him. While he found that he could process about 600 lbs/hr with a 4-person crew, he did say that the machine is fairly large for small wash areas (about 3' by 12', plus room on either end for loading and sorting) and with his muddy clay soil, it has to be cleaned regularly, including cleaning out clogged valves and nozzles.

Jenny and Bruce Wooster also recently purchased a rinse conveyor and shared their thoughts on using this rinse conveyor in another post. Bruce notes, "Overall, it has improved our speed and organization and we would buy this again. We've also been able to add sanitizer in the re-circulating tank, which works well for the bunches…We used to wash the bunches in barrels on the floor, so ergonomics and speed are better in the conveyor, especially for bunches of beets, carrots, scallions, and onions." Bruce also said that there can be a lot of mud to clean out at the end of a roots wash, and that the machine is loud and the pressure nozzles do create a lot of mist. Some of his employees like to wear goggles and ear protection.

We've been talking with several growers about this machine, as we are learning about it. Some are seeing this as an alternative to a brush washer due to the ease of cleaning and sanitizing and we are seeing increased use throughout the region.

We put together a playlist of videos about the machine. The first video explains how it works and the next couple show the machine in action. The last video shows how easy it is to clean it up once you're done for the day.

Do you know of any other postharvest wash equipment that are effective, efficient and easy to clean? We'd love to get more input from other users of this machine or others. Shoot us an email (ageng@uvm.edu). Thanks!

Editor's note – The Agricultural Engineering Team at University of Vermont Extension—Chris Callahan and Andy Chamberlin—maintain a fantastic blog about technology and equipment relevant to farmers, including information on post-harvest improvements and meeting new food safety requirements. This article was compiled from several posts about the AZS Rinse Conveyor. You can read all of their posts and subscribe to the blog and connect on social media here: http://go.uvm.edu/ageng.

Vendor Info: AZS Brusher Equipment, 821 Crooked Ln, Ephrata, PA 17522, Phone: (717) 733-2584

KNOCK WEEDS OUT AT CRITICAL TIMES

--by Mark Schonbeck, Virginia Association for Biological Farming for eXtension March 23, 2010

The "control" part of mechanical weed control aims to remove weeds that threaten current or future production at the least possible cost in labor, fuel, machinery and potential harm to the soil. Trying to eliminate every weed on the farm would likely lead to red ink, and can defeat efforts to build healthy soil. Thus, the farmer must continually evaluate: do I need to kill the weeds in this crop now? When are the critical times for weed control during the course of the season? For the organic farmer, critical times for weed control are those points at which cultivation or other measures will most effectively protect current and future crops from the adverse effects of weeds. Critical times include:

- When the crop is planted
- When flushes of weed seedlings are just emerging
- During the crop's minimum weed-free period
- When perennial weed reserves reach their minimum
- Before weeds form viable seed or vegetative propagules

Start with a Clean Seedbed. Weeds that emerge before or with the crop have a greater impact on crop yield than later-emerging weeds. Planting into a clean, weed-free field is essential. Remember that an apparently clean seedbed prepared just a few days before the vegetable is planted may have millions of germinating weed seedlings per acre that have not yet visibly emerged. Whenever possible, plant immediately after the final step in preparing the ground – whether that step is harrowing, rototilling, incorporating amendments, shaping the beds, or strip-tilling the crop rows.

For many crops, blind cultivation can be used to keep the seedbed clean until the crop is up. Larger-seeded vegetables can be rotary-hoed to give them a head start. Weed seedlings that beat slow-germinating crops like carrot to the punch can be removed by flaming. Some farmers time this operation by covering a small patch with a pane of glass. When the crop first emerges under the glass, the field is flame-weeded. The rest of the crop then emerges a day or two later, in a clean field.

Get the Weeds When They are Small. The smaller the weed, the easier it is to kill through light cultivation or flame weeding. Early in the growing season when large "flushes" of weeds often emerge, many farmers do a very shallow cultivation when weeds are in the "white thread" stage or are just emerging (long before the weeds begin to compete with the crop), rather than waiting until the field is visibly weedy. Shallow cultivation often pays because it:

- Minimizes damage to soil structure and soil life
- Minimizes light-stimulated germination of additional weeds
- Requires less fuel and less effort
- Can kill millions of newly emerging weeds per acre

This approach may be especially advantageous during early stages of crop establishment and growth. Cultivate before weeds get more than an inch tall. Some weeds develop an incredible ability to re-root and survive light cultivation once they pass this stage. Weeds two to three inches tall require more vigorous cultivation, which consumes more fuel, disrupts soil structure, and stimulates additional weed seed germination. One possible disadvantage to this "proactive" approach to timely cultivation is that it can result in multiple passes through the field to keep removing small weeds until the crop is established.

Avoiding Overcultivation: Minimum versus Critical Weed-Free Periods. Weed scientists and farmers have a couple ways of estimating when cultivation is most important for keeping weeds from hurting the current crop. One is to ask how long after crop planting can weeds be allowed to grow before they must be removed (the "maximum weed-infested period"). Another is to ask how long the crop must be kept clean before later-emerging weeds can be allowed to remain (the "minimum weed-free period"). A third is to determine the stage(s) of development in which the presence of weeds is most likely to hurt yields (the "critical period of weed competition" or "critical period for weed control").

Assuming that the crop is planted into a clean seedbed, germinating crops and weeds start their "race" at the same time. Weeds that germinate with the crop usually do not affect the crop's growth until two or three weeks after emergence –

when they first become large enough to begin competing for moisture and nutrients. This initial "grace period" during which weeds can grow without reducing the crop's yield potential is the **maximum weed-infested period**. The farmer needs to cultivate or otherwise control weeds before the end of this period.

Weeds that emerge with or shortly after the crop have the greatest potential for causing economic damage if allowed to grow unchecked. Later emerging weeds have less effect, and those that emerge after a certain point in time no longer affect yield. This point is the **minimum weed-free period**.

The interval from the end of the maximum weed-infested period until the end of the minimum weed free period defines the **critical period for weed control for the crop**. Since the crop can be adversely affected either by early-emerging weeds allowed to persist into this period, or by weeds emerging during this period and allowed to grow, the weed control strategy should focus on keeping the crop clean through this time. If cultivation is limited to one or two passes, it must be strategically scheduled within this period, and implements designed to be effective against the largest weeds present must be used. Possible advantages to this approach include:

- Less labor and machinery time is expended on weed control
- Fewer operations are easier to schedule
- Less frequent disturbance of the soil surface can mean less surface crusting and erosion
- Larger weeds leave more residue that can further protect soil surface from degradation

However, this approach can be risky especially in vegetable crops that are not highly competitive or have long critical periods for weed control (e.g., carrot), or that need to be quite clean at harvest (e.g., salad mix). When cultivation is delayed until the beginning of the critical period for weed competition, the farmer depends on favorable conditions for effective cultivation at that time. If an untimely rain falls, the additional delay will likely result in a significant yield loss. Therefore, most Extension agents and consultants advise organic vegetable growers to "get weeds while they are small," especially early in crop development.

Keep the Crop Clean Through its Minimum Weed-Free Period. Once the early flushes of weeds have been knocked out, continue monitoring and controlling later-emerging weeds until the crop has passed through its minimum weed-free period. For vigorous vegetables this period is generally the first one-third of the crop's growing season, or four to six weeks for crops like tomato, squash, cucumber, snap bean, and transplanted brassicas; and perhaps a little longer for eggplant and pepper. Less vigorous crops like onion or carrot may need weed-free conditions for at least the first half of their life cycle, perhaps eight weeks or more.

How "clean" is clean enough during this period? Crops differ in their inherent weed tolerance even during the minimum weed-free period. Slow-growing, weed-sensitive vegetables like parsley, direct-sown onion or carrot can suffer if weeds are allowed to reach the two-leaf stage before cultivation. Thus, it may pay to "cultivate early and often," knocking weeds out in the white-thread stage until the crop is well established. In vigorous crops like beans, sweet corn, or potatoes, one early cultivation and a second pass to remove later-emerging weeds at the two-leaf stage or even a little larger, may be sufficient.

While the crop is still small, those weeds emerging closest to crop plants compete most severely. Therefore, cultivation must effectively remove within-row weeds, as well as weeds between rows. Timing is critical for mechanical within-row weeding, which works only when the weeds are tiny and the crop is sufficiently large that it can withstand the effects of light cultivation. Later in the minimum weed-free period, the growing crop begins to shade out emerging within-row weeds, while weeds emerging between rows can still grow unimpeded and pose a threat. At this point, some vegetables can be cultivated with a between-row implement adjusted to throw some earth into the row to bury and thereby hinder small within-row weeds. This works well for potato, corn, tomato, broccoli, and other tall vegetables that tolerate hilling-up, but of course not for lettuce, spinach, and other vegetables whose edible parts form close to the ground.

Hit Perennial Weeds When Their Reserves are Low. Invasive or wandering perennials like quack grass, nutsedge and Canada thistle that reproduce through a propagating network of rhizomes, roots, stolons, tubers or bulbs are often the most difficult to manage. An initial tillage pass deep enough to chop up these structures will effectively propagate the weed, as each fragment soon regenerates a new plant. However, these plants are weaker than the larger plants growing from undisturbed underground structures. During the first three or four weeks after fragmentation, the pieces of root or rhizome

draw down their underground reserves in order to regenerate shoot growth. When the growing weeds each have several open leaves, they begin rebuilding reserves through photosynthesis. Soon thereafter, they can begin to form new rhizomes, bulbs, tubers, or other vegetative propagules.

Additional tillage, or even simply removing top growth, whenever the weeds reach the three to four leaf stage can be quite effective in further weakening invasive perennial weeds. The farmer may need to do this several times at three or four week intervals to knock out a serious infestation. Planting buckwheat or other "smothering" cover crops at high seeding rates immediately after tillage intensifies pressure on the weed, and can get the job done faster with fewer tillage passes. When wandering perennial weeds emerge in a vegetable crop, cultivate to sever top growth whenever the weeds reach this critical three to four leaf stage. Sharp sweeps or knives set to work just below the soil surface will do the job.

News

Agricultural Composting Regulations: Comments on Proposed Changes to the Regulations. Public Hearings Scheduled.

The Massachusetts Department of Agricultural Resources (MDAR) is accepting written comments on changes to the following regulation: 330 CMR 25.00: Agricultural Composting Program. The full text of the regulations is available at https://www.mass.gov/service-details/mdar-proposed-amendments-to-regulations.

Written comments should be addressed to:

Gerard Kennedy, Director, Division of Agricultural Conservation and Technical Assistance,

Department of Agricultural Resources, 251 Causeway Street, Suite 500, Boston, MA 02114

or by email at Gerard.Kennedy@state.ma.us

MDAR will accept written comments until August 1, 2018.

In addition, the Department will hold two public hearings to accept oral testimony. Written comments will be accepted before and at the Hearing:

- July 26, 2018 from 5:30 PM to 7:30 PM: Jones Library (lower level), 43 Amity Street, Amherst, MA 01002.
- August 1, 2018 from 5:30 PM to 7:30 PM: The Boyden Library, 10 Bird Street, Foxborough, MA 02035

A hard copy of the full text of the regulation and background information are also available upon written request made to at the address above.

Events

Twilight Meeting Summer Series

This series of Twilight meetings is an opportunity to learn from fellow farmers and find out what's new in Extension research. A light meal will be provided at each program.

Organic Weed Management

Featuring: Langwater's Kevin O'Dwyer and their flame weeder and leaf mulching techniques. Invited presenters include: Katie Ghantous (UMass Vegetable Weed Technician) with a vinegar weed injector, on-farm trial and information on weed ecology; Sonja Birthisel (UMaine PhD candidate studying Weed Management) with results of her research using occulation and solarization, and farmer Tyson Neukirch with his experiences using silage tarps in a reduced tillage system for weed management.

When: Tuesday, July 24th, 2018 from 4:00 pm to 7:00 pm

Where: Langwater Farm, 209 Washington St., North Easton, MA 02356

CLICK HERE TO REGISTER: https://www.surveymonkey.com/r/X9WLFYS

Click here to request special accommodations for this event.

UMass Extension Vegetable Program Research Tour and Round Table

Featuring: Sue Scheufele's research on cucurbit downy mildew resistance, pollinator protection in butternut squash, effects of different mulches on broccoli pests, and natural predators of cabbage aphid. Also, Madelaine Bartlett's research on corn genetics and the importance of genetics in crop development and improvement, Omid Zandvakili's research on lettuce nutrition, Kelly Allen's research on Fusarium wilt of basil, presentations on pollinators & agriculture and solar & agriculture, and more! Research presentations will be followed by dinner and a round table discussion.

When: Tuesday, August 14th, 2018 from 4:00 PM to 7:00 PM (Rain date: August 16th)

Where: UMass Crop and Animal Research and Education Farm, 89-91 River Rd., South Deerfield, MA 01373

CLICK HERE TO REGISTER: https://www.surveymonkey.com/r/X3JYR55

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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, and Brookdale Fruit Farm's new line of no-till transplanters from Checchi-Magli. 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/XF8JQYD

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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