UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

High tunnel crops like these peppers at Bardwell Farm in Hatfield are generally fairing well in this drought, as high tunnels are more likely to have had irrigation set up from the get-go. Photo: S. B. Scheufele

Crop conditions

Storms brought a welcome dose of rain to most of the state this week. Many locations got from between a few tenths to nearly an inch—we'll take what we can get! The water was a boon to folks putting in fall transplants now and may have given irrigators a break for a day but is not nearly enough and fields are still dry. The state increased the drought status again for the Connecticut River Valley and the Southeast regions, which now join the Northeast and Central regions in Level 3-Critical Drought status. At level 3, there's a ban on all non-essential outdoor water use. (Per MassDEP, essential uses are defined as uses required a) for health or safety reasons; b) by regulation; c) for the production of food and fiber; d) for the maintenance of livestock; or e) to meet the core functions of a business. Nonessential uses are those other than essential uses.)

Later successions of lettuce and brassica seedlings are sizing up in greenhouses and there's a lot of harvesting going on. Field tomatoes are truly bountiful now and melons and cantaloupes are coming in by the pallet bin. Storage onions are being harvested and cured—see the article this issue for tips. We've heard from a few growers that their pumpkins were pushed along too quickly by the heat and are maturing now, well-ahead of schedule. There's not much new to report as far as pests go, but the usual suspects continue to aggravate crops, including foliar diseases in tomatoes and cucurbits and caterpillar and beetle pests across many crops.

We changed the date for our upcoming twilight meeting at Harvest Farm of Whately, with farmer Gary Gemme. Gary will now host us on Thursday, September 8. We're excited that Chris Callahan from the University of Vermont Extension Ag Engineering program will be there to talk about cold chain management from harvest to storage. See the event listing in this issue or our website here for more details and to register. Hope to see you there!

Pest alerts

Chenopods

Cercospora leaf spot is continuing to develop in beets and Swiss chard, appearing as small brown spots that expand and can coalesce into large blighted areas of leaves. In red varieties, Cercospora leaf spots are surrounded by red haloes. Control of Cercospora is difficult, even with conventional fungicides. Fungicide applications must begin before or as soon as symptoms are seen in the field. Resistance to FRAC group 11 fungicides has been reported, so use other materials in fields where group 11 products have been used repeatedly in the past. Other conventional options include

Contact Us:

Contact the UMass Extension Vegetable Program with your farm-related questions, any time of the year. We always do our best to respond to all inquiries. **Office phone:** (413) 577-3976 *We are currently working remotely but checking these messages daily, so please leave us a message!* **Email:** umassveg@umass.edu

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

Tilt (group 3), Fontelis (7), and Merivon (7+11). Use the highest labeled rate of any product for best control. Tank-mixed Double Nickel and copper provided the best control among OMRI-listed products in Cornell Cooperative Extension research trials.

Cucurbit powdery mildew on a squash leaf (left) and a severe, late-stage infection in pumpkin (right, Photo: M. T. McGrath).

Cucurbits

Cucurbit powdery mildew is continuing to spread through cucurbit fields where unsprayed susceptible crops are being grown. Cucurbit PM starts as small, round white spots of powdery fungal growth on the top or underside of cucurbit leaves. As the disease develops, leaves will die back, exposing fruit to sun and risking sunscald. PM-resistant varieties are a great way to manage this disease without spraying fungicides. See a compiled list of resistant cucurbit crops from Cornell here. Controlling PM using fungicides requires regular sprays of PM-targeted materials and broad-spectrum fungicides, beginning before symptoms are seen in a crop. For details, see the article from Meg McGrath of the Long Island Horticultural Research & Extension Center in the June 16, 2022 issue of Vegetable Notes.

Symptoms of cucurbit downy mildew on cantaloupe - quite different from the angular lesions that develop on cucumber. Photo: M. T. McGrath

Cucurbit downy mildew: Cucumbers and cantaloupes are starting to go down from cucurbit downy mildew. Downy mildew has not been reported on other cucurbit crops north of Tennessee (butternut squash) and South Carolina (acorn squash/summer squash), and there is currently low risk of movement from those locations to MA. DM-resistant cucumber varieties are available, which should provide a few extra weeks of harvest after susceptible varieties go down completely—resistant varieties include Bristol, Citadel, DMR401, NY264, and Espirit.

Bacterial wilt is continuing to develop in cucurbit crops where striped cucumber beetles have not been controlled. Bacterial wilt is vectored by striped cucumber beetles. While SCB will feed on all cucurbit crops, cucumber and muskmelon are highly susceptible to bacterial wilt whereas watermelon is less susceptible. There is no control for bacterial wilt aside from controlling SCB. Conventional insecticides for foliar control include carbamates, pyrethroids,

Bacterial wilt in squash.

and neonicotinoids. All are highly toxic to bees and should only be used before bloom. Some systemic products may also be applied through drip irrigation. The diamide product Harvanta is also labeled for SCB – trials from the University of Delaware have found that it doesn't kill the beetles at the same rate as neonicotinoids but does stop SCB feeding. The most effective OMRI-listed material is pyrethrin (e.g. Pyganic), which is a contact insecticide with little residual and must hit the beetles to kill them.

Table 1. Squash vine borer trap captures for week ending August 11	
Whately	0
Leominster	0
Sharon	-
Southampton	1

Squash vine borer trap counts have fallen in the last few weeks, indicating the end of the moth flight. Larvae are continuing to feed within infested stems, causing wilt and plant collapse. Look for sawdust-like frass at the base of plants and slice open stems to look for larvae. Once larvae are within the stems, they are protected from insecticide sprays, but if you have a severe infestation, conventional growers can plan to control them next year with Assail or pyrethroids (e.g. Brigade , Asana, Warrior, Perm-Up/Pounce) directed at the bases of the plants once flights begin. Organic growers can use Entrust or Agree WG. In small plantings, if plants have gone down to SVB, killing the larvae inside can help reduce your local population for next year.

Table 2. Sweetcorn pest trap captures for week ending Aug 11

Location	GDD[1] (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
Western MA						
Deerfield	1923	0	0	-	132	*3 days*
Feeding Hills	1994	4	0	0	22	*4 days*
Granby	1942	7	0	3	12	*4 days*
Hatfield	1890	1	0	-	6	*5 days*
Whately	1989	8	5	7	11	*4 days*
Central MA						
Leominster	1903	6	0	0	75	*4 days*
North Grafton	1753	1	0	0	13	*4 days*
Sutton		2	0	0	13	*4 days*
Spencer	1837	6	0	0	5	*5 days*
Eastern MA						
Bolton	1924	0	0	3	40	*4 days*
Concord	1922	17	0	0	22	*4 days*
Haverhill*	2005	12	0	0	50	*4 days*
Ipswich*	1795	7	0	0	17	*4 days*
Littleton	-	15	0	0	3	*4 days*
Millis	-	14	0	n/a	33	*4 days*
North Easton	1947	-	-	-	70	*4 days*
Sharon		0	0	n/a	-	-
Sherborn	1974	12	0	0	12	*4 days*
Seekonk	2151	0	0	1	41	*4 days*
Swansea		0	0	4	27	*4 days*

- no numbers reported for this trap
N/A this site does not trap for this pest

[1]GDDs are reported from the nearest weather station to the trapping site
*Trap counts are from the previous week

Sweet corn

Corn earworm trap counts are still high, with most trapping sites on a 4-day spray schedule. **Fall armyworm** larvae are continuing to do damage in whorl-stage corn despite low FAW trap counts. Early FAW damage will appear as "windowpane" damage, where the larvae eat the leaf through to the lower epidermis, leaving a transluscent film of tissue behind. As the larvae grow, they move down into the whorl and cause large, ragged feeding holes that are accompanied by lots of frass. Once they are within the whorl, they can be protected from insecticide sprays, so if you are seeing lots of obvious FAW damage, it may be worth checking younger successions of corn and applying a whorl-stage spray if the succession has 12% or more plants infested with FAW alone or combined with ECB.

We are still amidst the 2nd flight of **European corn borer**, which started in late July. ECB infestations are largely being cleaned up by CEW sprays at this point in the season.

Identifying caterpillars in sweet corn

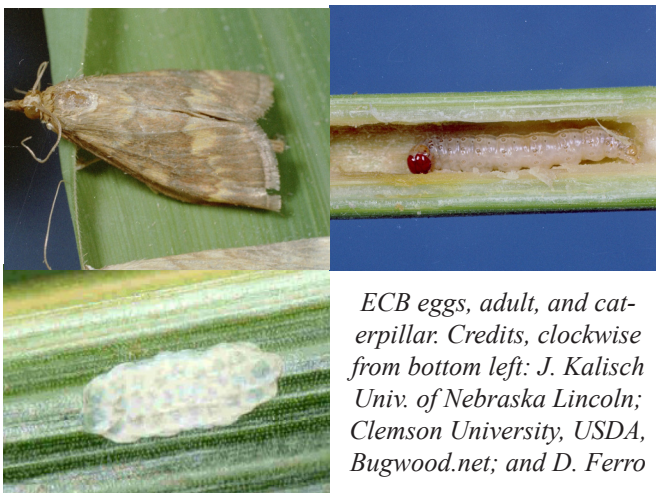
We are at the point in the season when all of the major caterpillar pests of corn are present in corn fields—European corn borer (ECB), corn earworm (CEW), and fall armyworm (FAW). The second ECB flight is happening now, and we are still seeing feeding damage from ECB larvae in the field. CEW moths are present in the Northeast earlier than they used to be due to overwintering in some Northeast sites instead of just blowing northward on storms from the south. FAW has been caught in pheromone traps across the state for several weeks now and growers can expect to start seeing damage in the field soon if not already.

If you are noticing unacceptable amounts of caterpillar damage in your sweet corn now, take the time to identify which corn pests are present. The most effective and efficient management strategy involves attracting and trapping moths using pheromones and using trap counts for each moth to inform spraying and/or scouting schedules. Earlier in the season, when ECB is the only caterpillar pest present, ECB trap captures tell us when the moth flight is beginning and therefore when to scout for caterpillars in the emerging tassels and early silks. ECB scouting results then tell growers if they are under or over a predetermined spray threshold. Once CEW arrives, the CEW trap captures determine the spray schedule: more moths caught per week mean fewer days between sprays. For more information on managing all 3 corn caterpillar pests, see the following articles in past *Vegetable Notes* issues:

Corn Earworm Management

Pheromone Trapping for Sweet Corn Caterpillar Pests

European corn borer is the first corn caterpillar pest to show up in sweet corn, as they overwinter in crop residues throughout the Northeast. ECB moths begin emerging in May (at 375 GDD base 50°F), mate, and lay eggs, which will hatch in 4 to 9 days, depending on the temperature. The newly hatched larvae will move to the closest protected feeding spot—whorl, tassel, ear—and will feed for 5 to 7 days before boring into the corn stem or ear. First generation larvae will pupate and emerge as adults at 1400 GDD (usually mid- to late-July) to mate and lay eggs. The second generation will overwinter as pupae, protected inside corn stems in the field. Historically, there have been 2 strains of ECB common in the Northeast, the New York strain and the Iowa strain. ECB-NY usually arrives in New England before ECB-IA, and in greater numbers. In an attempt to understand why we've been seeing lots of feeding damage despite low trap counts over the past few years, NY and NH have deployed hybrid ECB-NY/IA lures as well, but the captures from these traps have not been high enough to explain the feeding damage discrepancy.



ECB eggs, adult, and caterpillar. Credits, clockwise from bottom left: J. Kalisch Univ. of Nebraska Lincoln; Clemson University, USDA, Bugwood.net; and D. Ferro

Adults are ¾ inch long moths, white to tan, with 2 dark, serrated lines running across the lower part of the forewings.

Eggs are laid in clusters on undersides of leaves—they are flat and overlap each other like fish scales. Eggs are white when freshly laid, becoming cream-colored then orange-tan as they mature. Before hatching, the black head capsules of the enclosed larvae are visible.

Caterpillars vary in color from light-gray to pink but always have small, dark spots on each body segment. They have brown head capsules, and light red-brown stripes running the length of their bodies. Mature larvae are ¾ to 1 inch long.

Where might you see ECB? Before there is silk, caterpillars bore into the tassel or stalk. The weakened stalk will often flop over and you will see flagging tops in the field. Once there is silk in the field, ECB will enter the ears through the silk channel, or bore directly into the side of the ear. You may often see them in ripening corn boring into the side of the ear next to the corn stalk.

Corn earworm historically did not overwinter in New England and was instead blown in on storms coming from the south or from western New York, where they overwinter, arriving in mid-July. In recent years, CEW is showing up earlier in the season, implying that there are pockets of overwintering populations of CEW in our region. Moths from overwintered CEW that are caught in pheromone traps will look "clean" and new, compared to moths that are blown up from the

South which often look beat up and dischev-eled from their long journey. Eggs are small transluscent globes laid in silks and are difficult to find. Eggs hatch in 2.5 to 6 days, and newly hatched larvae enter the ear through the silk channel and feed for 3 to 4 weeks before pupating. Although each female lays several eggs on each ear, you will only find one caterpillar per ear, as the small caterpillars are cannibalistic. Moths are blown in throughout the growing season, so spikes in trap captures, followed by increased caterpillar damage are sometimes linked to storms. Additionally, a 2nd generation of moths can emerge to mate and lay eggs.

CEW adult, eggs, and caterpillars, showing variation in color. Photos, top to bottom: E. Burkness, UMN, Bugwood.org; B. Huchison, Univ. of Minnesota; R. Clark II.

FAW adult, eggs, and caterpillar. Photo,s top to bottom:C. Barrentine, BugGuide.net; F. Peairs, Colorado State Univ., Bugwood.org; J. Castner, Univ. of Florida

Adults are yellow-brown moths, with a dark spot in the middle of each wing and a dark band across the bottom of each wing. Live or newly dead moths have light green eyes.

Eggs are tiny, white, and round. In the silk, they look like dew drops and are very hard to see.

Caterpillars vary in color, similarly to ECB, from green to pink to brown to nearly black. Alternating light and dark stripes run the length of their bodies, and they have sparse hairs covering their bodies. Each body segment has a group of 3 small dots on the side. The head capsules are always plain golden brown (compared to the head capsules of FAW, which have a Y pattern—see photo below).

Where would you be seeing CEW now? CEW are in ear tips—look for messy frass and/or chewed up silks.

CEW (left) and FAW (right) head capsules. FAW head has an upside down y-shape. Photo: A. Eaton

Fall armyworm does not overwinter in the Northeast; moths are blown northward on storm fronts, usually starting in mid-July. CEW is also blown in on storms, though they don't always move together. Females prefer laying their eggs in whorl-stage corn. Eggs are laid on leaves and hatch in ~5 days. The larvae feed in the whorl and newly forming tassel, creating large, ragged holes in the leaves and dropping big clumps of frass. Larvae feed for 15 to 20 days.

Adults are ¾-inch long, mottled dark gray moths, with some light spots on their wings and an obvious white area at the extreme tips of their wings.

Eggs are laid in masses on leaves and are surrounded by fuzzy hairs from the female moth.

Caterpillars are light-tan to dark black, with some longitudinal striping along their bodies. Their bodies are smooth, unlike the hairy CEW caterpillars. When viewed head on, FAW head capsules are divided by an inverted "Y", compared to the solid CEW head capsule.

Where would you be seeing FAW now? Check whorl-stage corn for large, ragged holes in the foliage, and big clumps of frass in the whorl. Often, the FAW caterpillar will be within the developing tassel. FAW will also bore into the sides of ears, similarly to ECB, and can also infest ear tips.

References:

Fall Armyworm, Corn Earworm, and European Corn Borer Factsheets, New York State IPM Program

Using IPM in the Field: Sweet Corn Insect Management Field Scouting Guide, UMass Extension

--Written by Genevieve Higgins, UMass Extension

Cucurbit viruses and transmission

We have seen a few cases of potyviruses in cucurbit crops in the last few weeks. Cucurbits are susceptible to more than 32 viruses, which can cause a wide variety of symptoms, including color breaking or mottling of fruit, mosaic or mottled patterns on leaves, and darkening, distortion, and/or blistering of leaf tissue. Most cucurbit viruses are part of the Potyvirus family (which includes potato virus y, though this virus does not affect cucurbits), and are vectored by aphids. Species of aphids that prefer potatoes are moving on to alternate host crops such as cucurbits now that potato vines are being mowed or desiccated. Please submit suspicious samples to the UMass Diagnostic lab.

Transmission. Viruses that are transmitted by insect vectors are classified as non-persistent, semi-persistent, or persistent, depending on the length of time the insect vector can retain infectious virus particles. Non-persistent viruses stay within the insect vector for only minutes to hours, compared to semi-persistent viruses, which can remain in the vector for days. Persistent viruses remain in the vector for the insect's lifetime and, in some cases, can even be passed from an infected vector to its progeny. Most of the viruses we encounter in cucurbit fields in the Northeast are non-persistently transmitted by aphids (except for squash mosaic virus, which is transmitted semi-persistently by cucumber beetles). Because non-persistent viruses only remain in the insect vector for up to a few hours, any movement of the virus from plant to plant has to occur quickly. Aphids probe plants briefly with their mouthparts as they move from plant to plant, in order to determine if they are on a preferred host plant or not. Even this quick probing activity can be enough to transmit a virus to a plant, even if the plant is not a preferred host of that aphid! Aphids can pick up the virus particles anywhere along their path and are very efficient at spreading them, often causing 100% of the crop to be affected. Insecticides can cause increased muscle twitching and probing in aphids, and so are generally not effective at preventing non-persistent virus transmission. The exceptions are insecticidal soaps and horticultural oils, which do not have this effect. Once a virus is present in a plant, it is there to stay, though fruit may not be affected if the virus was acquired after pollination occurred. Mechanical transmission of viruses from plant to plant may also occur via movement of plant sap by equipment or workers (e.g., during pruning or harvesting). Some viruses can be seed-borne and other may overwinter on weed hosts.

Prevention. Once a virus becomes visible in your crop there is no cure or chemical treatment, so prevention is essential. Furthermore, the severity of disease caused by viruses is usually determined by the timing of infection—the earlier infection occurs, the greater the impact on plant growth, fruit symptoms, and fruit set. Delaying the onset of infection by several weeks can have a dramatic effect on the amount of damage.

Cultural Practices

- Start with certified virus-free seed, as some viruses can be seed-borne in particular crop species.
- Where possible, do not grow ornamental plants and vegetable transplants in the same greenhouse, as viruses often have large host ranges including vegetables, ornamentals, and woody plants and may be introduced on infected plugs.
- Plant resistant cultivars. Many resistant varieties are available in a variety of crops including cucumber, summer squash, and melons. Resistance is derived from traditional breeding as well as through genetic engineering, while some species are naturally resistant to certain viruses.
- Cover crops with floating row covers in the spring to prevent the early influx of virus-carrying aphids. Be careful with this tactic, as aphid populations can develop quickly under row cover if present when the crop is covered, and row covers will exclude beneficial insects that might otherwise help control aphid populations. Make sure plants are not already infested before you apply row covers. Remove covers when flowering begins to allow for pollination.
- Reflective mulches may repel aphids. Though slightly more expensive, they may be cost-effective if viruses are a chronic problem.
- Eliminate weed host reservoirs such as shepherds purse, dandelion, field bindweed, purple dead nettle, and Canadian goldenrod.
- Prunus species (peaches, cherries, etc.) are attractive to green peach aphids. Removing wild cherry trees from around fields can make the area less attractive to green peach aphids. The green peach aphid is not the only aphid that trans-

mits viruses, but it is important because it is a vector of many different viruses that affect cucurbit crops.

- Handle plants as little as possible, clean tools frequently, and work in clean fields first and affected fields last to minimize mechanical transmission by workers and equipment.
- Remove and destroy affected plants to prevent a source of virus for further infections.

Insecticides. Because most cucurbit viruses are transmitted non-persistently and thus very rapidly, insecticides DO NOT act quickly enough to prevent infection or control disease spread. (Put another way, by the time an insecticide has killed a virus-carrying aphid, the aphid has already spread the virus throughout many plants by probing). Systemic materials are generally the most effective insecticides available for aphid control because they are taken into the plant tissue and ingested by aphids when feeding. However, when probing a leaf, an aphid is not feeding and does not ingest plant sap or insecticide. In fact, the presence of an insecticide may actually stimulate aphids to probe more quickly, and to move from plant to plant rapidly, in an effort to find a suitable feeding site. This can increase the spread of non-persistently transmitted viruses in cucurbit crops. Mineral oil sprays have been used to deter aphids from feeding, but this method can be costly and unreliable. Conversely, controlling spotted and striped cucumber beetles can effectively reduce the spread of squash mosaic virus through a field because those insects transmit SqMV semi-persistently—the beetles must feed for 5 minutes in order to acquire the virus.

Important Viruses. Listed below are the six viruses you are most likely to encounter in New England cucurbit fields. Of these, cucumber mosaic virus and watermelon mosaic virus occur every year and papaya ringspot virus occurs most years in the Northeast. Squash mosaic virus is mostly introduced via contaminated seed. Zucchini yellow mosaic virus has not been seen in the Northeast for many years. A note on the naming of viruses: Viruses are named for the first host that they are identified on, and for the first symptoms identified on that host. For example, cucumber mosaic virus was

Virus symptoms in squash. Clockwise from top left: Cucumber mosaic virus; Papaya ringspot virus; Watermelon mosaic virus; Zucchini yellow mosaic virus. Photos: M. Babadoost

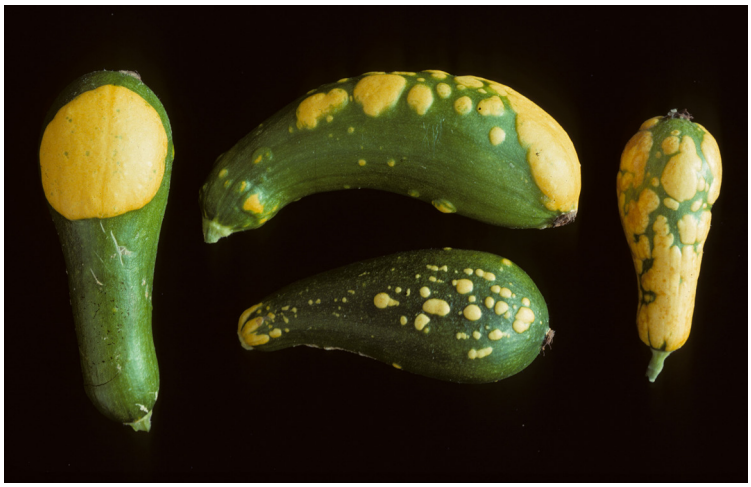
first described causing a mosaic pattern on the foliage of cucumber. Many viruses have wide host ranges and cause wide ranges of symptoms - they are not limited to the host crop nor the symptoms that they are named. It is difficult to diagnose viruses in cucurbits from symptoms alone, as most of the common viruses can produce similar symptoms – diagnosticians usually rely on lab tests (similar to a COVID rapid test!) to diagnose plants with viral symptoms.

Cucumber mosaic virus (CMV) causes severe plant stunting, prominent foliar mosaic, malformation, and downward cupping and reduced size of leaves. Flowers may be malformed or have greenish petals. Fruits may be distorted, discolored, and small and may not produce many seeds. Summer squash, some melons, and some pumpkins are most severely affected, while cucumbers, watermelons, and winter squashes are less severely affected. The host range of CMV includes at least 1200 plant species including many vegetables, ornamentals, and woody tree species. CMV is non-persistently transmitted by over 60 species of aphid, including green peach, potato, and foxglove aphids. CMV may be seed-borne in some cucurbit crops and weeds including chickweed (*Stellaria media*). Most varieties of cucumber are bred to have good CMV-resistance. Some summer squash varieties carry a "precocious yellow gene" which masks the color-breaking effect caused by CMV infection, some have intermediate resistance, and others carry high transgenic resistance to CMV. Melons may carry intermediate resistance to CMV, though no commercial muskmelon varieties are resistant. Most watermelon varieties are naturally resistant to the most prevalent strains of CMV.

Papaya ringspot virus type W (PRSV-W) causes prominent foliar symptoms including a green mosaic and leaf malformation, puckering, distortion, and narrowing. Affected fruit is malformed, knobby, and exhibits color-breaking. PRSV-W is non-persistently vectored by over 20 species of aphid, including cowpea, melon, foxglove, potato, and green peach aphids, but is not seed-borne like CMV. PRSV-W can be effectively prevented by host resistance in cucumber, melon, winter and summer squash, but no watermelon varieties are resistant.

Squash mosaic virus (SqMV) affects squash and melons and some species in the family Chenopodiaceae. Foliar symptoms include green vein-banding, mottling, a dark green mosaic, blistering and hardening of leaves, ringspots, and protruding of veins at leaf margins. Infected fruits are mottled and infected melons lack netting. SqMV can be seed-borne, and this is the primary source of inoculum for outbreaks. Once introduced, SqMV is transmitted by spotted and striped cucumber beetles. Beetles acquire the virus after feeding on an infected plant for 5 minutes and can retain the virus for 4 to 20 days. because the beetles must feed for so long to acquire the virus, controlling cucumber beetle populations will help reduce spread of SqMV.

Watermelon mosaic virus (WMV) causes green mosaic, rough wrinkled leaves, darkening of leaf veins, chlorotic rings and malformation. While foliar symptoms can be severe, especially in winter and summer squash, fruit is gener ally not affected. Yellow colored summer squash fruit may develop green spots. The host range of WMV includes most of the plants in the Cucurbitaceae family and the virus overwinters primarily in wild legumes (*Trifolium* spp., e.g., clovers), as well as members of the Chenopodiaceae and Malvaceae families. WMV is non-persistently vectored by over 20 species of aphid, including foxglove aphid, potato aphid, and cowpea aphid. WMV is not seed-borne in cucurbits or legumes. Resistant varieties of cucumber are available.



Zucchini yellow mosaic virus on summer squash fruit. Photo: R. L. Wick

Tobacco ringspot virus in squash. Photo: R. L. Wick

Zucchini yellow mosaic virus (ZYMV) causes a yellow leaf mosaic, severe malformation and blistering, reduced leaf size, and plant stunting. Squash and pumpkin fruit are reduced in size and greatly deformed and knobby. Muskmelon and watermelon fruit are also reduced in size and deformed, and develop deep cracks. Of the cucurbits, pumpkin, summer squash, muskmelon and watermelon are especially affected. ZYMV is also non-persistently transmitted by aphids, including melon and green peach aphids. New varieties of squash, melon, and cucumber have been developed with high, transgenic resistance.

Tobacco ring spot virus (TRSV) is rare in MA but has been observed in PA. Initial symptoms on cucurbits are pin-point necrotic leaf spots with bright yellow haloes that develop into a bright yellow mosaic on young leaves. The initial onset of symptoms is followed by a slow recovery. Older leaves remain dark green but are reduced in size and plants are not very productive. Fruits of infected watermelon plants may develop elevated pimples and ringspots. This disease is primarily vectored by dagger nematodes, but can be mechanically transmitted by equipment or workers, and can be seed-borne.

--Written by Bess M. Dicklow, retired UMass Plant Diagnostician, and Susan B. Scheufele, UMass Extension Vegetable Program

HARVEST AND CURING TIPS FOR ONIONS

Deciding when and how to harvest onions, then where and how to cure them can be challenging. When are they really ready to be pulled? Is the weather too wet or, more likely this year, too hot to field cure? How did my onion field get so weedy? What should I do if there is a lot of foliar disease in my crop? Here are a few tips, originally from University of Minnesota Extension :

Lodged tops in an onion crop, drying down in the field. Photo: C. Hoepting

Harvest: Optimum harvest from the standpoint of maximum storage life (before bulb sprouting), occurs while the onion foliage is still partially (30-40%) erect, and long before maximum yield is attained (when tops are completely down and dry). Since yields may increase 30-40% between the stage when tops begin to go down and when the leaves are fully down and dry, it is tempting to leave onions to cure in the field as long as possible. The optimum time for harvest therefore, must be a balance between highest yields and reduced bulb storage quality. From UGA Extension: "Maturity is best determined by pinching the neck of the growing onion. Necks of immature onions are stiff, while necks of optimally mature onions are soft and limber. When the necks are so weak that they cannot support the tops, the onions are over-mature. Simply observing the percentage of tops having fallen over is not a true indication of maturity, since the tops can be knocked over by strong winds, rain or become limp from lack of moisture."

Digging and windrowing: To facilitate curing onions for harvest and storage, onion rows are undercut and lifted and, if the onions will be cured in the field, they are windrowed. Rod-weeder diggers and knife undercutters are most often used. Onions are commonly dug and windrowed with tops on – tops can be layered on top of bulbs to protect the bulbs from sunscald. After field drying has occurred, the onions may be topped and placed in storage buildings, or moved to a curing space to continue drying down.

Curing: The goals of curing onions are to properly dry down the outer bulb layers to protect the onion bulb and to dry down and seal any wounds that may have occurred during harvest. Onions can be cured in the field, in open sheds, or by artificial means before or in storage. Adequate curing in open sheds may require 2 to 4 weeks, depending on the weather, with faster curing occurring in hotter, dryer weather. Optimal curing conditions, which also result in the best skin color, are 75 to 80°F and 70-80% relative humidity, with good air circulation. Onions are considered fully cured when the neck is tight and the outer scales are dry and make a rustling sound when handled. When you pinch the neck between your fingers, it should feel dry and not juicy and slippery. This condition is reached when onions have lost

3-5% of their weight. If not adequately cured, onions are likely to decay in storage. The common form of decay is Botrytis neck rot, which occurs at the top of the bulb – hence its name "neck rot".

Topping: Most onions are cured with tops on and topped before being moved to storage. Remove tops when they are totally dry, or, only remove the dry portion. Cutting through any portion of the top while it is still green or moist allows for entry of bacteria and fungi and most commonly can result in excessive Botrytis neck rot in storage. When all or a portion of the onion top is left on, the remaining tops are removed during grading and packing. Topping is either done by hand or with mechanical roller toppers.

Move cured onions into a well-ventilated storage barn to come down to storage temperature slowly with the environmental temperature. Photo: R. Hazzard

Here are our low-tech recommendations for curing and storage in New England: A greenhouse or hoophouse provides a good environment for curing, where temperature, airflow, and moisture can be somewhat controlled. Be sure to keep the temperature in the house below 85°F, which will probably require turning on fans and/or leaving sides and doors wide open. Consider using shade cloth over the house to help moderate temperature. Curing can be done in the field, but it is harder to achieve good conditions for curing in an uncontrolled field setting. Avoid field-curing onions if rain is forecasted and, if it does rain, let the onions dry fully before handling. Handling bulbs when they are wet can facilitate the spread of fungal and bacterial diseases that can further develop in storage. If the field is weedy, it may be excessively moist and air circulation may be limited; these conditions are not suitable for curing, so bring onions inside to cure. Temperature and sun are also factors to consider—sunshine and temperatures in the 80s will enhance the bronze color in the skins, but extremely hot sun and temperatures in the 90s can cause sunscald. Onions curing on a sandy soil will heat up more quickly than those curing on a heavier soil.

Storage: To ensure maximum storage life, onions must be promptly stored after curing. Get them out of the sun, as exposure to light after curing will induce greening of the outer scales. The optimum temperature for long-term storage of onions is 32°F with 65-70% relative humidity, but it is important to bring them down to this temperature slowly. In fact, holding onions in a barn or garage so that they cool along with the average outdoor temperature in late-summer and fall works quite well. Avoid cooling bulbs to well-below the average daily temperature because they will draw moisture from the warmer air, which can lead to disease. If you are selling the onions within a couple of months, keeping them in an uninsulated barn is fine. An insulated storage room is needed for longer-term storage.

Tips for Best Quality

Be sure onions are well-dried and necks are tight (i.e. the tissue does not slide when you roll the neck between your fingers) before topping. Bacterial diseases and Botrytis neck rot can move through green tissue into the bulbs. These diseases do not move through dry tissue.

Leave 2-3 inches of neck on the bulb. This increases the distance from the cut surface to the bulb for these pathogens to travel.

Minimize mechanical injury during harvest & topping. Reduce drops to 6" and pad sharp surfaces. Bruises provide direct entry points for diseases to get started.

Grade out damaged onions before putting them into storage. Damaged bulbs give off moisture, which is favorable for development of diseases in storage.

--Written by the UMass Vegetable Program

News

MDAR Launches Local Food Purchase Assistance Cooperative Agreement Program (LFPA)

MDAR is soliciting proposals for projects that specifically address the goals of the United States Department of Agriculture ("USDA") Local Food Purchase Assistance Cooperative Agreement Program ("LFPA"). The purpose of this program is to maintain and improve food and agricultural supply chain resiliency. To access the RFR visit COMMBUYS - Bid Solicitation.

MDAR is seeking projects to purchase domestic food from local and regional producers, target purchases from Socially Disadvantaged farmers/producers, and distribute food to underserved communities. Preference will be given to applications that demonstrate how relationships and distribution channels will continue past the conclusion of this program. The suggested dollar value of projects is between $50,000 and $750,000 and this program does not have a Federal cost sharing or matching requirement.

Applications are due by 2:00 pm on September 16th, 2022, and must be submitted to LFPAGrant@mass.gov. Applicants may submit questions regarding the RFR and application process. Please submit questions by email to: LFPAGrant@mass.gov.

An informational webinar where questions may be asked will be held for interested applicants on Thursday, August 18, 2022, 6:00pm. The webinar will be 1 to 1.5 hour(s) in length, and cover the LFPA Grant Program and provide information on accessing the MassGrown Exchange platform. Follow this link to register for the webinar.

Visit this webpage to learn more about the LFPA Program.

MDAR now accepting applications for the Ag Food Safety Improvement Program

The goal of the Ag Food Safety Improvement Program (AFSIP) is to support **produce and aquaculture** operations that are looking to upgrade their food safety practices that work towards minimizing the risk of microbial contamination and food-borne illnesses, meet regulatory requirements, and improve market access. AFSIP is a competitive, reimbursement grant program that funds 80% of total project costs up to $50,000.

Applications are due by 4:00PM on Friday, September 30, 2022. Please refer to the AFSIP website for more information and a copy of the application: www.mass.gov/how-to/agricultural-food-safety-improvement-program-afsip

Massachusetts Tomato Contest to be held on August 23

The 37th Massachusetts Tomato Contest will be held at the Boston Public Market on Tuesday, August 23. 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.

Open to commercial farmers in Massachusetts, growers can bring tomatoes to the market between 8:45 am and 10:45 am on August 23 or drop their entries off with a registration form to one of the regional drop off locations on Monday, August 22. Drop off locations include sites in Great Barrington, South Deerfield, Worcester, Dighton and West Newbury. These tomatoes will be brought to Boston on Tuesday.

For complete details, including drop off locations, contest criteria, and a registration form, click here. Be sure to include the registration form with all entries.

The 36th 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.

Questions? Contact David Webber, David.Webber@mass.gov.

Events

UConn Greenhouse Biological Control Conference

When: Tuesday, August 16, 2022

Where: Jones Auditorium, Connecticut Agricultural Experiment Station, New Haven, CT

Registration: $30. Pre-registration required. Registration includes a bagged lunch. Click here to register.

UConn Extension is sponsoring a Greenhouse Biological Control Conference. The speakers featured at this educational program include:

- *Ron Valentin*, Anatis BioProtection, who will be speaking on **Update on Banker Plants**
- *Suzanne Wainwright Evans*, Buglady Consulting, who will be speaking on **Releasing Natural Enemies, and Grower Case Studies: What's Working?**
- *Michael Brownbridge*, Bioworks, who will be speaking on **Enhancing the Use of Biological Fungicides in a Biologically Based IPM Program**
- *Elwood Roberts*, Plant Products/Biobest, who will be speaking on **Tips on How to Effectively Integrate Biological Controls and Chemical Controls**

Registration or refund questions? Contact Carla Caballero, carla.caballero@uconn.edu.

Program or payment questions? Contact Leanne Pundt, leanne.pundt@uconn.edu.

Disclaimer: Program format is subject to change based on the University of Connecticut and the State of Connecticut's COVID 19 guidelines and policies. If access to the venue or seating capacity changes, the program will be changed to a virtual format.

**This work is supported by the Crop Protection and Pest Management grant no. 2017-70006-27201 from the USDA National Institute of Food and Agriculture.*

Soil Health in the Field: Earthworm Sampling and Earthworm Indicators

When: Tuesday, August 30, 2022, 9:30am-1pm

Where: UMass Crop & Animal Research & Education Center, 89 River Rd., South Deerfield, MA 01373

Registration: Free! Space is limited. Click here to register.

Earthworms are a favorite field-indicator of soil health. While you might think all earthworms are created equal, earthworms are categorized based on behavior and location in the soil. Learning to identify the earthworms that we sample can enhance our interpretation of this soil health indicator and give us a better understanding of soil processes. This workshop is lead by entomologist Dr. Olga Kostromytska with UMass Extension and earthworm expert Dr. Annise Dobson of Yale University. This workshop is appropriate for complete beginners and experienced samplers alike. We will take samples in row crop, hayfield, and forest soils and practice identification using a key, hand lens, and dissecting microscopes. Earthworm types collected from each of the three fields will be compared, and we will discuss how we can use these findings to interpret the soil health. This is a translatable skillset valuable for agricultural service providers, farmers, and scientists.

If you would like to stay for a BYOL picnic (bring your own lunch) please feel welcome to do so. Bring a lawn chair or picnic blanket to sit outside, enjoy the scenery, and chat with soil health minded friends and colleagues. *Coffee and donuts provided in the morning.*

Twilight Meeting at Harvest Farm - NEW DATE!

When: Thursday, September 8, 2022 from 4-6 pm, followed by food and refreshments (Originally scheduled for August 24)

Where: Harvest Farm, 125 Long Plain Rd., South Deerfield, MA 01373

Harvest Farm in Whately/South Deerfield will host us for a twilight meeting on the cold chain--keeping produce cold from harvest to market. Chris Callahan from UVM Extension Ag Engineering will join us to talk through harvest strategies, pre-cooling techniques and equipment, and produce storage including cooler maintenance. We'll tour the farm's post-harvest facilites and see the vacuum cooler that Harvest Farm recently purchased with a MA Food Security Infrastructure Grant.

Click here to register.

Save the Date - Pollinator Habitat Workshop

When: Thursday, Sept. 22, late afternoon/early evening (exact time TBA)

Where: Just Roots Farm, 34 Glenbrook Dr, Greenfield, MA 01301

Come learn about the nuts and bolts of installing pollinator habitat on your farm, including where to find funding and who to contact for assistance. Includes a short presentation and a meet-and-greet with local service providers. Event is hosted in collaboration with CISA, NOFA, Greening Greenfield and Just Roots.

Thank you to our 2022 sponsors!

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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.