UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

Check the spray pattern of your sprayer by spraying water onto gravel, pavement, or dirt. Areas that dry faster may represent a clogged nozzle; areas that dry slower may represent a nozzle hole that has been worn out.

Crop conditions

Brassica bonanza has started, with bok choy, cabbage, kales, kohlrabi and now broccoli harvests underway. Loads of greens and bunches of beets, carrots, scallions, and green garlic are filling in farmstand shelves and share boxes, summer squash and zukes are starting to roll in, and the first of the peas are being picked. Early tunnel cukes and cherry tomatoes are just coming in and high tunnel tomatoes are sizing up and starting to blush. Strawberry harvest is really picking up, while a slow asparagus season winds down as temperatures rise.

Sunny and warm weather this week made for good weed killing. Fields are looking good and most are catching up (or have caught up) after the slow start. We are starting to see more diseases popping up this week—bacterial diseases like canker in tomato and black rot in brassicas, fungal diseases like early blight in tomato and leaf spots in beets, and downy mildews in basil and onions were are all confirmed across the region. Warm, wet weather in the forecast could mean more chances for diseases to infect and to spread. Unlike managing insect pests, where we often wait to treat until a population has built up to a damaging level, disease management must be made preventively. This might be a good time to get your sprayer out, inspect your nozzles and screens, check your spray pattern, and calibrate your sprayer to make sure you are putting out the right amount of material and getting good coverage—check out the June 28, 2018 issue of Veg Notes or download the Agricultural Pocket Pesticide Calibration Guide for complete instructions. It also helps to have a spray plan in place and to have the materials that you will need on hand, so that you are ready to go when disease spread is likely.

If you'd like to know what the Veg Team is up to in between issues of *Veg Notes*, follow us on Instagram @umassvegetableteam!

Pest alerts

Basil downy mildew was found on 'Amazel' basil Long Island this week, indicating that the downy mildew pathogen has overcome the disease resistance bred into this variety. Four downy mildew-resistant varieties developed by Rutgers are available through VDF Specialty Seeds—Obsession, Passion, Devotion, and Thunderstruck. None of these four varieties is fully resistant to downy mildew but the disease will develop more slowly on all four varieties than on fully susceptible varieties, and so far none have "broken".

Beets, Chard, Spinach:

Leaf spots are being reported on beet greens and spinach this week. There are several diseases that affect foliage of beets, chard, and spinach including Phoma, Cercospora, and Stemphylium leaf spots (all caused by fungi) and bacterial leaf spot. Each has different optimal conditions for growth and different management recommendations, so submit samples to the UMass Plant Diagnostic Lab to determine which disease is present and consult the New England Vegetable Management Guide for recommendations.

Brassicas:

Flea beetle: Some uncovered waxy brassicas are still below threshold, while unprotected non-waxy greens are more likely to have higher flea beetle damage at this point. Cover newly seeded or transplanted crops, treat waxy brassicas with kaolin clay (Surround), or scout uncovered brassicas regularly and treat when fields reach a threshold of 1 beetle per plant or 10% average damage.

Imported cabbageworm eggs are hatching and caterpillars have been found feeding throughout MA. For leafy brassicas or heading brassicas after head formation, treat when 15% of plants have at least 1 caterpillar. Before head formation, treat when 35% of plants have at least 1 caterpillar.

Cucurbits:

Striped cucumber beetle is continuing to emerge and numbers are increasing in cucurbit fields across the state. A Middlesex Co., MA field that was treated with Pyganic was found to be at threshold again just a few days later, as more beetles had moved in from field edges. Keep scouting after treating fields and remember that multiple treatments may be necessary to control the first generation. FarMore treated seeds have offered effective control. See the article in last week's *Veg Notes* for more management recommendations.

Herbicide injury: We have seen and heard of several cases of herbicide injury from products such as Prowl and Strategy, likely caused by all that early rain washing the material from between the rows into the root zone. Symptoms of injury from Prowl include pruned, stubby roots, (a symptom also known as "bottle-brushing"). Secondary root pathogens often move in to damaged roots and cause disease. Aboveground symptoms include stunting, general slow growth, and nutrient issues. Symptoms of Strategy injury include bleached leaf spots. The crop should grow out of this injury.

Solanaceous:

Colorado potato beetle are continuing to lay eggs in eggplant and potato and some eggs were just starting to hatch in a potato field scouted in Middlesex Co., MA this week. Treat potatoes at a threshold of 0.5 adults, 4 small larvae, or 1.5 large larvae per plant, or per stalk when plants are more than a foot tall. When eggplant is less than 6" tall, treat at a threshold of 2 small or 1 large larva per plant. When eggplant is larger, treat at a threshold of 4 small or 2 large larvae per plant. See article this issue for management recommendations.

Flea beetle was at threshold in one field of kaolin-treated eggplant in Middlesex Co., MA. Remember that when transplants are dipped in kaolin before transplanting, only the leaves present at that time will be protected and a second application may be needed to protect new growth which is very susceptible to attack. This pest will also attack potato but strongly prefers eggplant—the Brazilian eggplant, jilo, seems to be their all-time favorite!

Three-lined potato beetle on tomatillo. Photo: G. Higgins

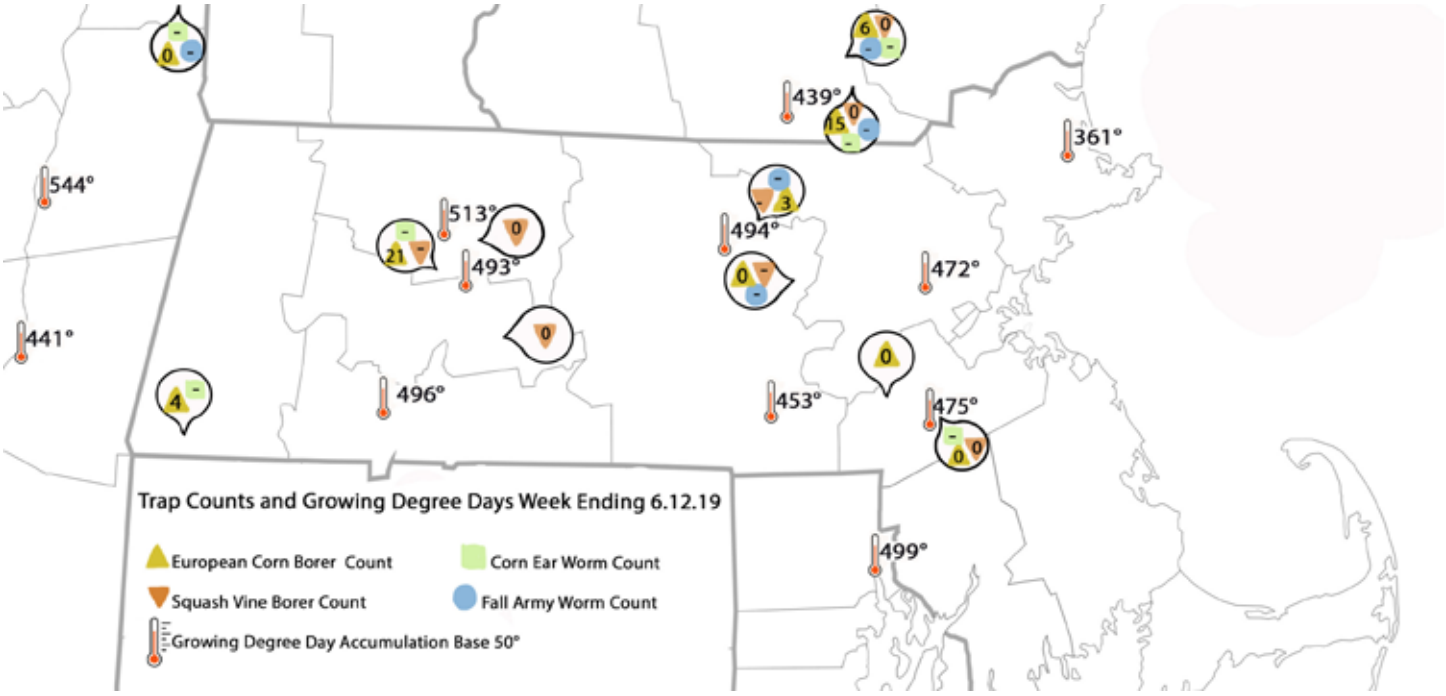
Three-lined potato beetle has been reported in MA. This pest will feed on potato but especially loves tomatillos and ground cherry. Damage usually is not significant enough to require insecticides. The larvae carry their own feces on their backs to deter predators! Who wants to squish that?!

Impatiens necrotic spot virus was diagnosed on peppers from a greenhouse in MA with both ornamentals and vegetable transplants. This is a common viral disease of ornamentals and is transmitted between plants by thrips. Separating ornamental and vegetable greenhouses can help you avoid transmission of INSV to vegetable crops.

Impatiens necrotic spot virus on pepper. Photo: A. Madeiras

Sweet Corn:

European corn borer: Numbers of adult ECB moths being captured in pheromone traps are on the rise across our trapping network this week, with both NY and IA strains present, but more NY than IA. *Trichogramma ostriniae* release should occur within a week after ECB flight, which should be about now. One farm in MA was above the threshold of 12 moths/week for silking corn, but most corn across MA is still in the pre-tassel or green tassel stage. At the tasseling stages, decisions about whether to spray or not should be made based on scouting—inspect tassels from 25-105 plants for presence of tiny caterpillars or feeding damage and frass. Spray is warranted if >15% plants are infested. Scout weekly and re-apply if needed.



Symbol	Meaning
No symbol	Not trapping for this pest at this location
-	Trap not yet set up
0	Trap set up and reporting zero captures

Multiple Crops:

Potato leafhopper was found in potatoes and beans this week, in Middlesex and Worcester Cos., respectively. Scout to determine when fields reach thresholds and treat before hopperburn symptoms appear. Sweep nets can be used to detect adults—treat at 1 adult per sweep. Or, treat if you see one adult per plant fly away when you shake foliage. Once nymphs appear, treat potatoes when you reach a threshold of 15 nymphs per 50 leaves and beans at 1 nymph per leaflet. Hopperburn can damage a crop very quickly, and multiple treatments may be required as leafhoppers continue to arrive in New England from the south.

Colorado potato beetle management

Adult Colorado potato beetle laying eggs in potato.

Colorado potato beetle (CPB) adults are actively moving into potato fields and laying eggs now, and egg hatch is just beginning. Increasing temperatures mean faster development and feeding rates. Cold, rainy weather slows both crop and insect growth, so eggs that are laid can pile up and then all hatch at once when it warms up. Knowing what to look for and getting out into the field to scout is key in determining when to use appropriate controls. CPB is also an important pest of eggplant, so these fields should be monitored as well. Good control of CPB in June will not only protect vulnerable crops now; it will also reduce the number of beetles in the next generation that will survive to feed on next year's crops. Both adults and larvae cause feeding damage, but larval damage is the most severe. Because the fourth and final larval stage (instar) does 85% of the feeding damage, it is critical to control larvae while they are small.

Life Cycle: In the Northeast, CPB survives on solanaceous crops and weeds, including horsenettle, nightshade, eggplant, potato, and tomato (primarily seedlings). CPB overwinters in the adult stage, generally in soil (up to 12 inches deep) in the woods and brushy borders next to host crops, though some burrow into soil right in the field. In spring, the beetles emerge to search for host plants. Adult CPB are fairly slow and clumsy; they can fly, but more often they walk into fields from overwintering sites. Heavy feeding may occur on edges of non-rotated fields. If beetles do not find host plants via walking they will fly in search of food. Once they reach a host plant, adults feed, mate, and lay eggs. One female can lay

up to 300 eggs in her lifetime. Eggs hatch in 7-10 days, depending on temperature. Feeding damage and larvae are easily seen on leaves. Larvae go through four molts (instars) before they pupate. In the first instar, the larvae are about the same size as the eggs and in the second instar they are about an eighth of an inch long. Mature, fourth instar larvae are hump-backed and plump, and reach 5/8"-long before they drop to the soil and pupate. Adults emerge from pupae after 10-14 days, leaving round exit holes at the soil surface. In southern New England there is a second generation of eggs, larvae, and adults in late-July, while in northern New England there is only one generation. Beetles fly or walk out of fields in August, seeking overwintering sites at field edges.

Newly hatched Colorado potato beetle larvae. Photo: K. Campbell-Nelson

Monitoring & Thresholds: Scout for beetles on 30 to 50 plants (or individual stalks later in the season). One recommended procedure is to walk the field in a V-shaped pattern and stop at 10 sites across the field. Randomize your selection of sites using a set number of paces, e.g. stop every 10 to 30 paces, depending on field size. At each location, select 3 to 5 plants (from when plants emerge until 12 to 18" tall); thereafter select 3 to 5 stalks at each site. Alternatively, select plants or stalks individually at random across the field. Count adults, large larvae (greater than half-grown), and small larvae (less than half-grown) separately. A treatment should be considered for adults when you find 25 beetles per 50 plants or defoliation has reached the 10% level. The spray threshold for small larvae is 4 per plant; for large larvae, 1.5 per plant (or per stalk in midseason). Potatoes can tolerate 15-20% defoliation without reduction in yield.

Scout every 3-4 days, especially if numbers are above the following thresholds: 15 adults, 75 small larvae, or 30 large larvae per 50 plants/stalks. Use these scouting sheets to help keep track of beetle populations; economic thresholds for each crop can be found at the top of each sheet: Potato, Eggplant, Tomato. These can be used for a range of insects and diseases in each crop.

Controls & Prevention:

Rotation. The single most important tactic for CPB management is to rotate potatoes, eggplants, and tomatoes to a field that is at least 200 yards from the previous year's fields. Barriers such as roads, rivers, woodlands, and fields with other crops are helpful, because CPB adults are such slow and clumsy movers. This single practice delays and reduces colonization by adults, and therefore number of eggs and larvae in the field later on.

Crop health. Starting with healthy seed and maintaining good crop nutrition help plants grow well and withstand feeding injury.

Barriers. Mechanical barriers such as trench traps, trap crops, and straw mulch also delay and reduce infestation.

Trenches. Install plastic-lined trench traps next to overwintering sites at least one week before adults emerge. Trenches should be 1 to 2' deep and 6 to 24" wide at the top. They can be U- or V-shaped with side walls sloping at angles between 65° and 90°. Beetles walking from field borders fall into the trench and cannot fly out.

Straw mulch. It has been well documented that when potatoes or eggplants are mulched with straw, fewer CPB adults will settle on the plants and fewer eggs will be laid. This can be accomplished on larger plantings by planting into a rye cover crop, mowing down the rye, then pushing the rye straw over the plants after they emerge. For smaller plots, straw may be carried in.

Perimeter trap cropping. Potato trap crops may be planted earlier than the main crop to attract beetles before the main crop emerges, or planted between overwintering sites and this season's crop. Flame, vacuum, or spray the border crop before beetles move into the main crop. Another approach is to plant three to five rows of potatoes treated with a systemic insecticide in a perimeter around the field; this treated border will kill up to 80% of the colonizing beetles. Planting main potato crops later than normal may also cause beetles to leave the field before potatoes emerge, resulting in lower beetle numbers.

Flaming. Flame weeders can be used to kill colonizing adult beetles when the crop is less than 5" tall. Move rapidly using a tractor-mounted or hand-held flamer. The goal is to scorch beetles, as injury to antennae and legs render them

unable to orient and climb plants. At this early stage, healthy emerging potatoes have sufficient reserves to regrow foliage and establish well.

Biological control. Predators and parasites of CPB suppress populations and help prevent crop injury. Natural enemies that attack CPB eggs or larvae include twelve-spotted ladybeetle (*Coleomegilla maculata*), spined soldier bug, a carabid beetle (*Lebia grandis*), and a parasistic tachinid fly. The fungus *Beauvaria bassiana* (e.g. Mycotrol) has been shown to suppress beetle populations, though it does not provide immediate control. If insecticides will be used, use selective rather than broad-spectrum products to conserve natural enemies. Be aware that ladybeetle egg masses look very similar to CPB egg masses, though lady beetle eggs are slightly smaller (~1mm) than CPB eggs (~1.7 - 1.8mm) and more yellow in color.

Chemical Controls & Pesticides: Scout to determine whether or not a damaging population is present. When using products that control only larvae or only small larvae, scout for eggs, note egg hatch, and apply controls before larvae reach third instar to avoid the worst feeding injury. For materials that control all stages, you may wait and scout for adults and larvae to determine the need to apply insecticides.

Resistance management must be part of every potato grower's plan. CPB has a remarkable capacity to develop resistance to insecticides. Based on a fifty-year track record, we can expect that any insecticide that is used repeatedly on the same population of CPB (that is, those in the same field or farm) will lose its efficacy in less than five years. Where potato production is concentrated and rotation has been limited, resistance may develop on a region-wide basis. It's up to you to manage resistance in the population of beetles on your farm, and keeping insecticides effective with careful rotations is a worthwhile investment. In the New England Vegetable Management Guide, as well as on pesticide labels, each insecticide has a Group Number, which identifies chemistries with the same mode of action. Growers should note the resistance group number of each insecticide, rotate classes of insecticides, and **avoid using the same chemistry more than once per year or even better, once every other year.** Do not use the same chemical class on successive generations in the same year. Use newer chemistries first. For conventionally managed fields, there are enough different products to do a two-year rotation that will effectively control CPB while effectively delaying resistance to any one product.

For organically managed fields, the selection of insecticides is limited to fewer active ingredients including spinosad (Entrust), azadirachtin (Azatin), pyrethrin (Pyganic), and *Beauvaria bassiana* (Mycotrol O, Botanigard), which can be tank-mixed and/or rotated. Unfortunately, the Bt product Trident that was recently developed against CPB has been discontinued due to formulation issues. With few products to choose from, it's more important to time pesticide applications so that they are as effective as possible and therefore reduce the need for subsequent applications.

For current information on potato insect management including an up to date list of insecticide groups that have products registered for Colorado potato beetle, please visit the New England Vegetable Management Guide.

Do not try to kill every beetle in the field. Potato crops can withstand 15% defoliation without affecting yields. Avoid treating potatoes for CPB late in the season, as defoliation after two weeks before senescence will have little effect on final tuber bulking.

-- UMass Vegetable Extension

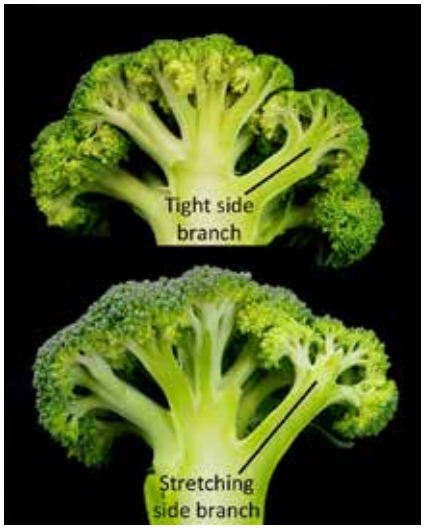
MANAGING NITROGEN TIMING IN SUMMER HARVESTED BROCCOLI

Written by Thomas Björkman, The Eastern Broccoli Project. Originally published in Cornell VegEdge on June 5, 2019.

One of the challenges with raising broccoli in the East is getting heads to stay dense. In the warmth of summer, the outer branches of broccoli tend to start elongating a little before harvest maturity. They "blow up" in the words of many producers. The result is a head that doesn't pack tightly in the box and has soft edges that are prone to damage in handling.

The solution is to let growth slow a little during the week before harvest. Growth is promoted by the combination of warmth, water, nitrogen, and sunlight. Warmth is a given for harvests in July and early August, sunlight we have no control over, and abundant water sometimes comes whether we want it or not. The main management tool is nitrogen.

Slowing growth by reducing nitrogen is a considerable challenge because abundant nitrogen is needed during the vegetative growth to get strong, healthy, fast-growing plants. The best approach is to supply nitrogen relatively early in the growing period, and not add nitrogen in the last four weeks.



Late nitrogen applications can cause early side-branch elongation, making the heads less desirable on the market. The top image shows a tight head with solid side branches. The lowe rimage has a head that has begun to loosen at the sides. This effect can be reduced by having the last nitrogen application at least four weeks befor eharvest so that the growth is slowing down a bit just as harvest begins.

Many popular broccoli varieties are harvested starting only eight weeks after transplanting. Therefore, the last nitrogen application should be only four weeks after transplanting. At that time, the foliage is near full cover, which a good time for a traditional side-dress application as well as cultivation to get escaped or newly germinated weeds. Fertigation through a trickle-irrigation system would be during the fourth week. At that time, the plants are large enough to take up the nitrogen but not so far along that excess growth at harvest will cause loose heads.

Applying all of the nitrogen before planting is a possibility. Ordinarily, applying 120 to 150 pounds per acre of nitrogen preplant is ill-advised because of the high likelihood of leaching before the crop takes it all up. However, because broccoli is only in the ground for about nine weeks through the end of harvest, and reaches its maximum uptake five weeks after transplanting, the risk of leaching loss is relatively low compared to the typical situation. Pre-plant application of the fertilizer opens up production options that don't allow side-dressing or liquid fertilization.

This early-nitrogen approach is also helpful in reducing hollow stem. Hollow stem is likewise a symptom of excessive late vegetative growth. The main tool for managing hollow stem is adjusting the plant population. If hollow stem is a problem, it's likely that both yield and quality will be improved by spacing the plants closer together. In New York we have found an in-row spacing of 8 inches to work quite well. But limiting late nitrogen also tempers the growth rate at the right time.

EFFECTIVELY MANAGING CUCURBIT POWDERY & DOWNY MILDEWS

Written by Meg T. McGrath, Cornell University, and published online. Links at end of article.

Effectively managing powdery and downy mildews is essential for producing a high-quality cucurbit crop. The two diseases are widely dispersed and occur every year. The key to successful management of both diseases is using resistant varieties when available and using targeted, mobile (translaminar) fungicides. See the table at the end of this article for mobile fungicides for managing major cucurbit diseases. Below are descriptions of the pathogens and links to more resources on choosing varieties with disease resistance and complete fungicide recommendations.

Powdery Mildew

This foliar, fungal disease is common wherever cucurbits are grown, including in the northeastern U.S. This is because the pathogen produces an abundance of asexual spores (the powdery growth) that are easily dispersed by wind, allowing it to spread widely. The pathogen can also produce sexual spores in fall that enable the pathogen to survive over the winter. Leaves affected by powdery mildew die prematurely which results in fewer fruit and/or fruit of low quality (poor flavor, sunscald, poor storability).

White powdery mildew sporulation can occur on both undersides and tops of leaves, and is not trapped by leaf veins. Photo: M.T. McGrath

Powdery mildew is managed with resistant varieties and fungicides. An integrated program with both management tools is the best approach for achieving effective control because the pathogen is adept at evolving new strains resistant to individual tools such as resistant varieties or a specific fungicide. It is more difficult for new pathogen strains to develop when an integrated program is used, and effective control is more likely. Powdery mildew management programs often need adjustments as the pathogen and management tools change.

Downy Mildew

Gray downy mildew sporulation develops between veins on undersides of leaves. Shown here on cucumber.
Photo: G. Higgins

Similarly to powdery mildew, downy mildew is a common foliar disease in the Northeast because the pathogen produces a large quantity of asexual spores that are easily dispersed long distances by wind, which enables it to spread widely. Unlike powdery mildew, there has been no evidence that the pathogen is surviving between growing seasons where winter temperatures kill cucurbit crops (outdoors above the 30th latitude); however, recently both mating types have been found, albeit typically on different cucurbit crop types, meaning that there is the potential for the pathogen to produce sexual oospores that could enable the pathogen to overwinter in the northern U.S. The downy mildew forecasting program has documented movement of the pathogen throughout the eastern U.S. each year via its wind-dispersed asexual spores. The pathogen does not affect fruit directly; however like leaves affected by powdery mildew, leaves affected by downy mildew die prematurely which results in fewer fruit and/or fruit of low quality (poor flavor, sunscald, poor storability).

Since 2004, varieties with resistance, which include most hybrids, have provided some suppression of the new pathogen strains present, but substantially less than the excellent suppression that was achieved against strains present before 2004. Fortunately, new sources of resistance have been found and cucumber varieties with these new genes for resistance are starting to become available. Varieties DMR 401, NY264, Citadel, and Bristol are all currently available varieties with strong resistance reported from variety trials conducted by Cornell and the University of Massachusetts in 2016-18.

Powdery & Downy Mildew Management

The most important components of effective management program for powdery and downy mildews are resistant varieties and properly-timed fungicides. Both diseases develop best on the undersides of leaves, so mobile (or translaminar) fungicides are needed to achieve successful control. Resistance to certain fungicides is widespread for both pathogens; fungicide recommendations change as new resistance develops or as new products are released. Always implement a resistance management program; do not wait until there is a problem. The goal is to delay development of resistance, not manage resistant strains afterwards. Because downy mildew is an oomycete and not a true fungus, targeted fungicides that control powdery mildew will not control downy mildew, and vice versa. Phytophthora blight, also caused by an oomycete, will usually also be controlled by fungicides that are effective for downy mildew.

Click here for the complete guide to the most current **downy mildew** fungicide recommendations.

Click here for the complete guide to the most current **powdery mildew** fungicide recommendations.

Guidelines on Managing Powdery and Downy Mildews

1. **Select resistant varieties.** Lists of resistant varieties are available here: http://vegetablemdonline.ppath.cornell.edu/Tables/TableList.htm

2. **Sign up to receive alerts about downy mildew occurrence** and routinely check the forecast web site (http://cdm.ipmpipe.org) to know where the disease is occurring and what crops are affected. We will also report on downy mildew movement in *Veg Notes*, so check *Pest Alerts* weekly for updates.

   The forecast web site is an important tool for determining when fungicide applications are warranted. Cucurbit plants are susceptible to downy mildew from emergence; however, this disease usually does not start to develop in the Northeast until later in crop development when the pathogen is dispersed by wind into the region. The forecast program monitors where the disease occurs and predicts where the pathogen likely will be successfully spread. The pathogen is thought to only be able to survive over winter in southern Florida, and from there spreads northward. The risk of downy mildew occurring anywhere in the eastern USA is forecast and posted three times a week. Forecasts enable timely fungicide applications. Growers can subscribe to receive customizable alerts by e-mail or text message. Information is also maintained at the forecast web site of cucurbit crop types being affected by downy mildew. This is important because the pathogen exists as two clades and pathotypes within each that differ in their ability to infect the various cucurbit crop types. Success of the forecast system depends on knowledge of where downy mildew is occurring; therefore prompt reporting of outbreaks by growers is critical.

3. **Inspect crops routinely for symptoms of both powdery and downy mildews** beginning at the start of crop development. Scouting routinely for early symptoms is important to ensure targeted fungicides are applied starting

at the onset of disease development. Photographs of symptoms are posted at: http://blogs.cornell.edu/livegpath/gallery/cucurbits/

4. In MA, powdery mildew usually appears before downy mildew. Apply protectant fungicides for powdery mildew control as crops develop. Protectant fungicides include Bravo and copper for both powdery and downy mildew, and sulfur and oils for powdery mildew. When you first detect powdery mildew in your crop by scouting, add a targeted material. Remember that targeted materials will be different for powdery mildew (a fungus) and downy mildew (an oomycete). When there is a risk of downy mildew for your specific crop in your area, incorporate a targeted downy mildew material into your spray program. See the table on the next page for targeted materials.
5. **Alternate among available chemistries based on FRAC codes** to manage resistance development and avoid control failure if resistance occurs, and also to comply with label use restrictions on number of consecutive and total applications allowed. Add new fungicides as they become available; substitute new for older products if they are in the same FRAC group.

--Compiled from articles written by Meg McGrath, Cornell University, and published online: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Cuc_PM_2016.html *and* http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Cuc_Downy.htm. *Recommendations modified for Massachusetts by the UMass Extension Vegetable Program.*

Table: Mobile Fungicides for Managing Cucurbit Powdery Mildew, Downy Mildew, and Phytophthora Blight in Cucurbits - Updated 2018

Created by Meg T. McGrath, Originally published online here.

Tank-mix each of the fungicides in the table below with one of the protectants listed below, with the exception of Zing! or Gavel, which are formulated with chlorothalonil or mancozeb. The need for tank-mixing is specified in use directions on many labels.

Sulfur: Very effective, inexpensive product for powdery mildew. Has no efficacy for other diseases.

Oils: Several botanical and mineral oils are available. Oils are also a good choice for powdery mildew only.

Chlorothalonil and copper: Have broad-spectrum activity. Copper is also effective for bacterial diseases.

Mancozeb: Recommended when only downy mildew is occurring.

Apply fungicides for a particular disease in alternation to manage resistance and to ensure effective control if resistance develops. The maximum number of consecutive sprays for a given product can be found in the use directions on many labels; typically 1 or 2 consecutive spray maximum.

Previcur Flex, QoI fungicides (including Amistar, Cabrio, Quadris, and Flint), and Ridomil fungicides are not recommended due to resistance.

Notes:

******Luna Experience and Zampro are NOT permitted for use on Long Island.*

[a]*Organosilicone and/or non-ionic surfactant required (Revus) or recommended.*

[b]*Quintec is labeled for use on non-edible-peel cucurbits (melon, pumpkin, winter squash, gourd). 10-14 day spray interval.*

[c]*Limited use recommended because resistance could affect efficacy especially when applied often. No more than one application of Endura or Torino recommended. Pristine not recommended now that Endura is labeled on cucurbits.*

[d]*Rate range applies for downy mildew; high rate for Phytophthora blight.*

[e]*PHI is 30 days for cucumbers and melons, 7 days for other crops.*

[f]*Other phosphorous acid fungicides include ProPhyt and Fosphite. Rate and seasonal limits vary a little among products. Recommended tank mixed with other fungicides. Note that there are also phosphate fertilizers, which are not fungicides.*

[g]*New Presidio label has only 2, not sequential applications. Plant-back restriction for most non- labeled crops is 18-month.*

[h]*Short residual; apply another fungicide within 5 days.*

[i]*Make no more than 2 consecutive applications of any before rotating to a different fungicide. When at least 3 applications, Orondis fungicides can be no more than 33% of the applications, or a maximum of 4 applications per planting, whichever is fewer.*

Orondis Opti is labeled for several other diseases because it contains chlorothalonil. It is only recommended used for these diseases when downy mildew is also present. Orondis Gold 200 is labeled for application to soil for Phytophthora blight. Its use in a crop prohibits foliar application of Orondis fungicides for downy mildew.

[j]*Ridomil Gold SL is recommended for Phytophthora blight only on farms where Ridomil fungicides were not used over several presiding years on other labeled crops (ex. pepper) as resistance may have developed already. Apply to soil at planting or through drip.*

Fungicide	FRAC Code	Diseases	Recommended Rate/A (labeled)	REI	PHI	Seasonal Limits
Vivando	U6	Powdery mildew	15 fl oz	12 h	0 d	3 sprays
Quintec [b, c]	13	Powdery mildew	6 fl oz (4-6)	12 h	3 d	24 fl oz
Luna Experience[*]	7 + 3	Powdery mildew	10-17 fl oz (6-17)	12 h	0 d	34 fl oz
Proline [c]	3	Powdery mildew	5.7 fl oz	12 h	7 d	2 sprays
Procure [c]	3	Powdery mildew	8 fl oz (4-8)	12 h	0 d	40 fl oz
Torino [a]	U8	Powdery mildew	3.4 oz	4 h	0 d	2 sprays
Endura [c]	7	Powdery mildew	6.5 oz	12 h	0 d	4 sprays
Orondis Ultra [i]	49+40	Blight, Downy mildew	5.5 - 8.0 fl oz	12 h	0 d	4 sprays or 33% of applica-tions
Orondis Opti [i]	49+M5	Downy mildew	1.75 – 2.5 pt	12 h	0 d	
Orondis Gold [i]	49	Blight	2.4 - 19.2 fl oz	12 h	0 d	
Ranman [a, d]	21	Blight, Downy mildew	2.75 fl oz (2.1-2.75)	12 h	0 d	6 sprays
Omega [e]	29	Blight, Downy mildew	0.75 – 1.5 pt	12 h	7/30	4-7 sprays
Zampro [*]	40+45	Blight, Downy mildew	14 fl oz	12 h	0 d	3 sprays
Gavel	22+M3	Blight, Downy mildew	1.5 – 2 lb	48 hr	5 d	8 sprays
Forum	40	Blight, Downy mildew	6 fl oz	12 h	0 d	5 sprays
Revus [a, c]	40	Blight, Downy mildew (low efficacy DM cucum-ber)	8 fl oz	12 h	0 d	4 sprays (32 fl oz)
K-Phite, etc.[f]	33	Blight, Downy mildew	2.5 – 5 pt	4 h	0 d	7 sprays
Tanos [h]	27+11	Blight, Downy mildew	8 oz	12 h	3 d	4 sprays
Presidio [g]	43	Blight, (Not recommended now for DM due to resis-tance)	4 fl oz (3 – 4)	12 h	2 d	2 sprays (new label)
Zing!	22+M5	Downy mildew	36 fl oz	12 h	0 d	8 sprays
Curzate [h]	27	Downy mildew	3.2 oz	12 h	3 d	9 sprays

News: Reminder to Report Crop Damages Promptly

2019 has presented farmers with challenging weather conditions and producers covered by a Federal Crop Insurance Policy are reminded to monitor their crops for insurable damage throughout the growing season. If you notice damage contact your crop insurance agent within 72 hours of discovery, 15 days before harvesting begins and within 15 days after harvesting is completed on the insurance unit. Three other important reminders:

1. Check with your crop insurance agents to review any prevented planting options.
2. Direct marketed crops must have a yield appraisal before they are harvested, if loss is anticipated.
3. Do not destroy crop evidence that is needed to support your claim without clear direction, in writing, from the insurance adjuster.

Producers having coverage under the Noninsured Crop Disaster Assistance Program (NAP) administered by the USDA - Farm Service Agency have similar loss reporting requirements. NAP producers should contact the FSA Office that serves their farming operation to report losses and to review prevented planting options.

UMass Extension works in partnership with the USDA Risk Management Agency (RMA) and various agricultural organizations to educate and inform Massachusetts producers about Federal Crop Insurance and Risk Management Programs. For more information, please visit www.rma.usda.gov or contact UMass Extension Risk Management Educators, Paul Russell at pmrrussell@umass.edu or Tom Smiarowski at tsmiarowski@umass.edu or check out our website: https://ag.umass.edu/risk-management.

Events

Vermont Vegetable & Berry Growers Association On-Farm 2019 Workshop Series

The Vermont Vegetable & Berry Growers Association is holding a series of nine on-farm workshops from June through November this year. For more information on all workshops in this series, please click the linked event title above.

Attendance at these events is free for members of the Vermont Vegetable & Berry Growers Association. The cost is $10 per-person for non-members, payable on-site. Refreshments will be served. Membership in the VVBGA costs $55 per farm, per calendar year. The VVBGA works with University of Vermont Extension to deliver education and applied research for its growers.

Questions? Contact Vern Grubinger, 802-257-7967 x303. To request a disability-related accommodation, contact Dana Rupert, 802-257-7967, three weeks prior to an event so we may assist you.

UMass/SARE Organic Strawberry Twilight Meeting

When: Thursday, June 20, 2019 – 5:30 to 8pm

Where: Red Fire Farm - Montague location, 184 Meadow Rd., Montague, MA

Join the UMass Fruit Team and Red Fire Farm to learn about some novel organic weed management strategies in straweberries. Tour Red Fire's trials and stay for light refreshments. For more information on the trials that will be presented at this meeting, see the event page, linked to in the title.

REGISTRATION: This event is free, but please RSVP for planning purposes by emailing the UMass Fruit Team at umassfruit@umass.edu.

Fruit and Vegetable Program Twilight Meeting at Indian Head Farm

When: Tuesday, June 25, 2019 – 4:30pm to 7:00pm

Where: Indian Head Farm, 232 Pleasant St., Berlin, MA 01503

Come hear from Extension Educators about research and management updates for brown marmorated stink bug, spotted wing drosophila, and high tunnel production issues, which we have worked on with Indian Head Farm over the last few years.

Indian Head Farm has also recently updated their irrigation system with Harris Irrigation, converting overhead to drip, through grant support from the Massachusetts Department for Agricultural Resources (MDAR), conservation support from the Natural Resources Conservation Service (NRCS). They are also in the process of a farm transfer to the

seventh generation, with support from Land For Good. Come learn how they do it all, socialize, and stay for a light supper.

**1 pesticide recertification credit is available for this workshop.*

REGISTRATION: This event is free, but please register by June 21 so that we can plan accordingly. Click here to register for this workshop online. Or, contact us at (413) 577-3976 to register by phone.

- 4:30 Introductions
- 4:45 Brown marmorated stink bug and spotted wing drosophila research and management updates – Liz Garofalo, UMass Extension Fruit Program
- 5:15 Automating drip irrigation – James Wheeler, Jim Peeler of Harris Irrigation, Gerry Pulano (MDAR Grants for farmers)
- 5:45 Management lessons from 20 New England high tunnels – Katie Campbell-Nelson, UMass Vegetable Program and Jon Sardell, Indian Head Farm Field Manager
- 6:15 Farm Succession Planning – Farmers Tim and Janet, and Kathy Ruff from Land for Good
- 7:00 Meeting adjourned.

THANK YOU TO OUR SPONSORS:

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