UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

Volume 28, Number 9 June 9, 2016

In this issue:

Crop conditions

In general, a good start to the season compared to last year's dry May. While New York and Connecticut struggled with a dry spring this year, Massachusetts had average temperature and rainfall this past month according to the National Weather Service. A mild turn in the weather this week has calmed down beetle pest activity in the state, but has increased the opportunity for diseases like late blight to take hold with cool, humid nights. At farm stands we're seeing beets, radishes, rhubarb, kohlrabi, the first summer squash that was under cover, greens, strawberries, greenhouse tomatoes and cucumbers. New potatoes are almost flowering and some outdoor tomatoes in eastern MA set out under cover in late April are even starting to bear fruit.

Growers are now finding out if their herbicide applications that were made last week before the rain worked or not. In one example, the grower made an application of atrazine at the same time in 2 successions of sweet corn where grassy and broadleaf weeds were just establishing. In the first succession, the crab grass had just exceeded the 2 leaf stage and the herbicide application did not work, but in the second succession, the weeds were smaller and the herbicide worked very well (photo). Timing is very important to ensuring that the herbicide dosage is enough to kill an emerging weed, and in sweet corn, post-emergent applications should be made before the corn reaches 5" tall and while grasses are still at the 2 leaf stage. Cultivation continues to be a task while crews are also beginning to get into harvest mode.

2 successions of corn after atrazine treatment, sprayed on the same day. Photos, M. Teixeira

Pest alerts

Allium: Onion thrips adults and nymphs numbers jumped to threshold of 1 per leaf by Monday this week despite the rain on Sunday in onion fields across the state. Repeat insecticide applications every 7-10 days, using shorter intervals in hot dry weather for most materials. Researchers at Cornell have developed a strategic plan for managing onion thrips in onions with insecticides, which calls for an initial treatment with Movento at the labeled rate, targeting nymphs. Include a penetrating adjuvant in all sprays for greatest efficacy. Make applications in early evening when thrips are emerging out of allium necks to feed using high pressure and 100gal water/A for best results.

Basil: Basil downy mildew has been reported in North and South Carolina in 3 greenhouses (one organically managed) on the varieties Eleanora and Greek Columnar.

Brassica: Flea beetle numbers are lower where treatments were applied in the last few weeks, though some organic growers are reporting poor efficacy with Pyganic (This product has a shelf life of 1 year and must be stored in a cool dark place since it breaks down in sunlight). Cooler, rainier weather has also helped in reducing pressure.

The first imported cabbage worm eggs and 1st instar larvae were found feeding on Brussels sprouts in Franklin Co., MA this week. Eggs can be found on the underside of leaves, and larvae feed more heavily in the center or head of

cabbage or broccoli. Scout fields by checking leaves (top and bottom) on 25 plants across the field. In the Northeast, there is generally no need to treat young plants unless at least 35% of them are infested.

Cucurbit: Striped cucumber beetle pressure has also been reduced following effective control. Scout 25 plants twice per week from crop emergence to 3-leaf stage, then weekly. Count beetles per plant and note damage to leaves and stems. The economic threshold depends on the crop. To prevent bacterial wilt in highly susceptible crops such as cucumber, muskmelons, summer squash, and zucchini, treat when there is 1 beetle for every 2 plants. Less wilt-susceptible crops (butternut, watermelon, most pumpkins) will tolerate 1 or 2 beetles per plant without yield losses. Spray within 24 hours after the threshold is reached. Many growers are now growing seeds treated with thiamethoxam and are achieving early season beetle control.

Solonaceous: Late blight (US 23) has been reported on tomato and potato in MD, WV and NJ this past week. Track progress of this disease at the USA Blight website: http://www.usablight.org. Cool evening temperatures and humid weather favor the spread of this disease. See article in this issue on using the LateBlight Decision Support System for Massachusetts (http://blight.eas.cornell.edu/blight/MA) to stay ahead on preventive sprays for this disease. Many growers are now planting tolerant varieties such as Defiant, Juliet, or Mountain Merrit with good success.

Black leg of potato has *not* been reported in MA this year, but reports have been showing up in newsletters and alerts around the region. Varieties Reba, Superior and Norwis from Maine seed have been identified as containing black leg, so pay attention to these varieties in particular this year. Affected plants have black stems extending up from the plant base and rotting seed piece with an offensive odor. The disease is difficult to identify from rotting tubers, so be sure to submit whole plants for diagnosis to the UMass Diagnostic Lab (phone: 413-545-3208). High temperatures and rain are favorable for this disease. All crops should be routinely scouted. There are no fungicides to manage blackleg.

Potato flea beetle found on eggplant in Washington Co., RI and Hillsborough Co., NH and additionally on potato in Hampshire and Bristol Cos., MA at threshold. Treat newly set eggplant or tomato transplants if they have 2 flea beetles per plant, 3" to 6" tall seedlings if they have greater than 4 beetles per plant, and plants over 6" tall if they have 8 beetles per plant. Potatoes can withstand more damage. Most insecticides registered to control CPB, including spinosad, will control FB.

Colorado potato beetle Eggs and adults, and just-emerged small larvae were found in potato fields in MA, and small larvae, which should be targeted for treatment, were above threshold of 4 per plant in an untreated field in Hampshire Co., MA. Adults and a few eggs are now being found in potatoes and eggplant in Washington Co., RI and Bristol Co., MA. See article this issue for management options and more information on this pest.

Three-lined potato beetle are being found earlier than Colorado potato beetle in potato in Hampshire and Bristol Cos., MA and Hillsboro Co., NH. The egg masses are more translucent than CPB. They prefer tomatillo, so don't plant into the same field.

Sweet Corn: European corn borer numbers are reaching a peak in some locations (Whately and Hadley MA) where corn is also up 2 ft or more (Table 2). Adults are expected to emerge at 374 GDD and egg-laying is expected at 450 GDD base 50°F. Egg-laying has begun at some locations

Table 1. Accumulated Growing Degree Days (F): 1/1/16 - 6/09/16

Location	GDD (base 50F)
Western, MA	
Ashfield	398.5
South Deerfield	473.9
Pittsfield	390.5
Central, MA	
Bolton	468.2
Northbridge	440.5
Phillipston	397.4
Eastern, MA	
Ipswich	366.8
Weston	497.6
Seekonk	521.1
Hollis, NH	452.2
Burlington, VT	500
Newport, RI	386.1

Table 2. Sweet corn trap counts for the week of 6/1/16-6/8/16

Location	ECB Weekly Total
Western, MA	
Amherst	2
Hadley	20
Sheffield	2
South Deerfield	1
Whately	24
Central, MA	
Bolton	0
Leominster	0
Eastern, MA	
Millis	0
Swansea	11
NH	
Litchfield	12
Hollis	30
Mason	1
Eerie Co., NY	1
Kingstown, RI	1

European corn borer (ECB)

Syrphid fly larva preying on aphid on Brussels sprout leaf. Photo, S. Scheufele

in the region (Table 1). Eggs hatch in about 5 to 7 days (100 degree days). Corn with newly-emerging tassels should be scouted weekly for the presence of ECB larvae by inspecting the tassels of 50 to 100 plants, in groups of 5 to 20 plants throughout the field. Treat if more than 15% of the plants have one or more larvae present. Timing sprays for tassel emergence reaches larvae in the whorl and the young tassel. A sprayer configuration with one nozzle directed into the tassel and a single drop nozzle to the upper parts of the plant gives the best control. At high levels of infestation, 2 applications may be needed to provide control. Use of selective products to control ECB will conserve natural enemies of aphids and ECB. One location in Eerie Co., (western) NY has captured **Fall armyworm** and **Corn earworm** .

Brussels sprouts interplanted with alyssum (above) and marigolds (below). Photos, L. McKeag

Multiple Crops: **Green peach aphid** has been found in clusters on eggplant in Franklin and Bristol Cos., MA this week and on Brussels sprouts in Franklin Co., MA. Only treat at five to seven-day intervals, if aphid numbers exceed 10 per leaf before fruit or budding, and 5 per leaf after fruit or budding. Coverage of underleaf surface is important. Add a spreader-sticker.

It's not all bad, though! **Beneficial syrphid fly larvae** were also found feeding on aphid clusters in Brussels sprouts and on grain aphids feeding on rye within an onion planting. These larvae are voracious feeders on aphids, thrips, leafhoppers, and other soft-bodied pests. Several species of lady beetle adults and larvae were found in abundance at a farm in Hampshire Co., MA. Look for beneficial insects as well as pests when scouting and consider these populations when making insecticide application decisions. One grower we visited is trying something new on his farm to combat increasing pressure from cabbage aphids - he has interplanted alyssum and marigolds within his Brussels sprouts to encourage beneficials. He also planted lettuce in the outer rows to make use of early season bed space, and increase spacing later in the season to increase air flow and prevent spread of Alternaria (see photos, right).

* When not given here, refer to the New England Vegetable Management Guide for scouting thresholds and treatment options.

CALIBRATING YOUR BACKPACK SPRAYER

Growers with diverse crops and small plantings often need to apply pesticide to beds or plots of only several hundred square feet, and backpack sprayers are the best tool for the job. John Grande and Jack Rabin of Rutgers made an excellent series of short videos on selecting, upgrading and calibrating backpack sprayers (http://snyderfarm.rutgers.edu/Backpack-Sprayers-Video.html). Watch the videos and read the accompanying handouts in the resources section below for tips on upgrading your backpack sprayer. If you don't have time for all that now, follow the steps bellow for calibrating your back pack sprayer so that you can get out there and spray… after scouting, correctly identifying the pest, and selecting the appropriate materials of course!

CLICK PHOTO FOR VIDEO LINK

Figure 1. John Grande at Rutgers University installs a barbed swivel with a pinch clamp. This very clear video includes all the parts and instructions to upgrade your backpack sprayer for improved comfort and efficacy

First, check your sprayer coverage and operation. Select the spray tip or boom setup that provides the desired coverage. Add water, and spray the ground or dry pavement as if you were spraying your field. Check fittings and hoses for leaks. Check the spray pattern for uniformity to make sure none of the nozzles are clogged and that you are achieving proper

spray pattern overlap (about 1-2") with the boom. You can also check it over the crop to see if you are getting good coverage by attaching water-sensitive cards to a piece of foliage and inspecting your spray coverage. (These cards are available from suppliers of spray equipment and pesticides.) Adjust nozzle spacing and/or height until you achieve the desired pattern. For insecticides and fungicides, your goal is to use sufficient water to cover the foliage with small droplets, but only until the point of drip off of leaf surfaces. Be certain you're getting uniform coverage before you proceed!

Here's how to calibrate your backpack sprayer:

Calculate what portion of an acre is being sprayed. Determine sq ft of area to be sprayed (multiply canopy width x row length x number of rows). Calculate how much of an acre this is (this may be a small fraction of an acre):

Example:

4ft canopy width x 250 ft bed length x 5 rows = 5,000 sq.ft.

5.000 sq. ft / 43,560 ft^2 per acre =

Acres to be sprayed = 0.115 acres

Calculate how much pesticide to use. Multiply the rate per acre for the crop and pest (from the label) times the proportion of an acre to be sprayed.

Example:

Pyganic 5.0EC at 10 fl. oz. per acre x 0.115 acres

Amount of Pyganic needed = 1.15 fl. oz.

Measure water needed per sq ft of crop. Add a known amount of water (eg 1 or 2 gallons) to the tank. Spray the water as if you were actually spraying your field and watch that your crop gets adequate coverage until water drips off the leaves, but not to drench the soil. When making a soil drench application, target the base of the plant and check if enough water is applied to percolate 2 inches deep. When making soil drenches for root pests, some growers remove the nozzles entirely, because soil drenching usually requires more water per acre in order to carry the product into the soil in a narrow band along the row. Maintain constant pressure, constant walking speed, and consistent nozzle height and boom setup or wand motion to achieve the coverage you need. This amount will change with different crops and size of crop canopy. When the water is gone, stop and mark the spot. Measure the area you sprayed and calculate the square feet (length of swath x width). Calculate how many gallons needed per sq ft.:

Example:

2 gallons used / 1000 sq. ft. tested

Gallon per sq. ft. = 0.002 gallons

Determine total water needed:

0.002 gallons x 5,000 sq. ft (from step 1 above)

Gallons of water needed = 10 gallons

Mix the required amount of pesticide in the required amount of water. It is best to add half the water, add the pesticide/s, agitate, then add the remaining water. Spray, using the walking speed, pressure, nozzle and boom setup or wand motion that you used for calibrating. When making tank mixes, add materials in the following order, agitating the tank between each addition: • Water Conditioners/Acidifiers • Wettable/Dispersible Powders • WDG's (Dry Dispersible granules) • Oil dispersions • Flowables (Suspension conc.) • EC's (Emulsifiable concentrates) • Emulsions (Micro and Suspension Emulsions) • Water Soluble concentrates (Soluble powers and liquids) • Adjuvants.

To speed up your mixing process, see the table below for commonly used labeled rates of organic insecticides converted into amounts per 100 and 1,000 sq. ft.

Note that the measure used for Entrust must be accurate to 1/10 ml! For Entrust, do not use more than 3 gallons of water per 1,000 sq ft. For many insect pests, the label requires no more than 2 consecutive applications and no more than a specific label allowable amount of Entrust per year, for resistance management.

You are now prepared to tackle your pest problems with an upgraded spray wand and an accurate calibration! Happy spraying, and don't forget your personal protective equipment (PPE).

Product	Amount per 100 sq ft	Amount per 1000 sq ft	Rate per acre
Pyganic 5.0EC	0.02 oz or 0.67 ml	0.23 oz or 6.7 ml	10 fl. oz
Entrust	0.014 fl. oz. or 0.4 ml	0.14 fl. oz. or 4.0 ml	6 fl. oz.
Surround WP	1 ½ - 3 cups	4.5 - 9 cups	50 lb

Resources:

Landgren, C.G. Calibrating and Using Backpack Sprayers, Oregon State University, Washington State University, University of Idaho.

Stivers, L. "Upgrade and Calibrate to Optimize your Backpack Sprayer" Pennsylvania Vegetable Growers News, Vol. 38: 3.

Grande, J. and Rabin, J. Rutgers University, NJ. "Field Demonstrations: Backpack Sprayers" Video Series: http://snyderfarm.rutgers.edu/Backpack-Sprayers-Video2.html

Grande, J. and Rabin, J. Rutgers University, NJ. "Backpack Sprayers Modified for Small Farm Crop Protection": http://snyderfarm.rutgers.edu/pdfs/Backpack-Sprayers-Companion-Handouts.pdf.

-UMass Extension Vegetable Program, updated for 2016 by K. Campbell-Nelson

COLORADO POTATO BEETLES ARE ON THE RISE

Colorado potato beetle (CPB) adults are actively moving into potato fields and laying eggs. Egg hatch can be expected soon. Increasing temperatures mean faster development and feeding rates. While a period of cold, rainy weather slows everything down, it may allow for eggs to pile up. We can expect a surge of shiny yellow eggs and young larvae to appear with warmer weather. Scouting fields–and knowing what to look for– is key in determining when to use appropriate controls. Colorado potato beetle is also an important pest of eggplant, and 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 that will reproduce in fields and overwinter 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 in the field. In spring the beetles search for host plants by walking from the field edges. Heavy feeding may occur on edges on non-rotated fields. If beetles do not find host plants via walking they will fly in search of food. Once host plants are found, 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, while in northern New England there is only one generation. Beetles fly out of fields in August, seeking overwintering sites at field edges.

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"-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 weekly. If population size is increasing, such as when new eggs are hatching or larvae are small, scout again in 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 and determine when economic thresholds are reached: 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. This single practice delays and reduces colonization by adults, and therefore number of eggs and larvae in the field later on.

Crop health. Production practices that include healthy seed and good crop nutrition help plants grow well and withstand feeding injury.

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

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

Flaming. Flame weeders can be used to kill colonizing adult beetles when emerging crop is under 3-4 inches high. 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.

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 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. Late planting may cause beetles to leave the field before potatoes emerge, resulting in lower beetle numbers.

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. *Beauvaria bassiana* 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 the egg masses of Colorado potato beetles, 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 a farm with nearby fields) 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. If your farm is isolated from other farms where potatoes are grown, it's up to you to manage resistance in the population of beetles on your farm. Note the resistance group number of each insecticide and avoid using chemistries from the same group. Wherever possible, growers should 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 genera-

tions in the same year. Note that 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. Avoid using insecticides from the same group. 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. Keeping insecticides effective with careful rotations is a worthwhile investment. For organically managed fields, the selection of insecticides is limited to fewer active ingredients including spinosad (Entrust), azadirachtin (Azatin, Azera), pyrethrin (Pyganic, Azera), and *Beauvaria bassiana (*Mycotrol O, Botanigard).

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 spraying the beetle in late season, as food reserves in the foliage two weeks prior to senescence add little to final tuber bulking.

-Ruth Hazard, UMass Extension Vegetable Program

FORECASTING TOOLS FOR LATE BLIGHT MANAGEMENT

It's never too early to start thinking about late blight preparedness, and with new reports in NJ, VA and MD this week, it may be an early year for this destructive disease. So far this year LB has been confirmed in Florida, South Carolina, Virginia, and Maryland, and both potato and tomato are being affected. So far all samples tested have been US-23 strain. Managing late blight (LB) successfully means being proactive and preventing disease before it starts. This means scouting your own fields to be sure you catch the very first infected plants and pull them out, but also paying attention to what is happening around you by finding out where the disease has been reported, which strains are present and which hosts are being affected this year. Luckily there are a lot of LB experts and climate resources there to help you answer these questions and make spray decisions without much thought or effort on your part. Here we will describe how to take advantage of some of these resources.

LB is favored by cool, wet weather–this means cloudy days, cool temperatures during the day or night, rain events, and high humidity or long periods of overnight dew. The exact conditions required for the late blight pathogen to infect a plant and produce new spores are known and have been used to develop models that can forecast when disease is likely to occur or spread. These models are based on severity values, which are calculated based on the temperature and the duration of leaf wetness period given current and forecast weather. For local sources of inoculum such as volunteer potatoes or contaminated seed tubers, the threshold for initiating late blight spray programs is 18 severity values accumulated since potato foliage emerged. That threshold has already been met in many parts of MA, and other areas are forecast to reach the threshold next week. Once the threshold is reached, that means if a local source of the pathogen is present, LB could develop on any susceptible plant tissue. However, if the pathogen is brought into MA on infected tomato transplants, as we've seen in past years, this threshold does not need to be met because under the right conditions, if the pathogen is present it will start producing spores. For risk-averse growers, this means a first protectant spray to prevent LB might be warranted whenever favorable conditions are forecast. Other growers may choose to wait until a disease outbreak is reported in their region, despite favorable environmental conditions–if this describes you please understand that if susceptible tissue is not protected before LB symptoms are present it may already be too late, prevention is key! To find out where the disease has been confirmed this year visit the national LB monitoring project, USABlight. Once the threshold is reached to initiate spray programs or the disease is present, these same models can be used to tell you when to spray based on the current and forecast weather. Below is an explanation of how these LB forecasting models work, the differences between different LB forecasting tools available on NEWA, and how to use our new MA DSS webpage, which will provide spray interval recommendations to MA growers that are updated daily based on current weather forecasts for 41 locations across the state.

First! Scout early and often. Here are some tips to help you find the first outbreaks of LB on your farm Also, check out this helpful YouTube video from eOrganic with lots of scouting tips and photos: https://www.youtube.com/watch?v=uCzIFVfyNow. The basic principle is:

Primary inoculum often arises from infected seed tubers or volunteer potatoes in the field or cull pile or compost heap, so

check for volunteers in the compost pile or in last year's potato field as well as early potato fields.

Look in wetter areas first: low-lying areas, field edges along creeks or ponds, areas prone to morning fog, near irrigation equipment that may cause puddles to form, in areas near woodlots or any area that is shaded or protected from the drying effects of wind. Areas where it is difficult to apply fungicides such as edges and corners should also be examined.

Look at healthy, moist tissue first: LB infections will start on succulent leaves, so look at new growth which may be unprotected by previous fungicide sprays, and look within the canopy where foliage stays moist longer.

Know your enemy: lesions look wet and dark-olive, brown or grayish, unless the lesion has dried out during a sunny spell–then they can look dry and tan-brown. If it's moist, white, fuzzy sporulation may be present on the underside of the leaf. Fruit rot is brown and hard, not soft.

Late Blight Forecasting. The Network for Environment and Weather Applications (NEWA) is a great resource with lots of available weather data (growing degree days, hourly-daily-and monthly precipitation and temperature) and pest forecasting tools. If you don't already know it, check it out, there's probably a weather station near you that you can use if you don't have your own on-farm weather station or to double-check your own weather station or app. NEWA houses information from a network of weather stations across New England and New York—in MA there are 41 of these networked stations so it's easy to find one near you. The LB models available there incorporate the current and past weather data as well as the temperature and relative humidity forecasts from the National Weather Service. The Simcast and DSS models also take into consideration the past and forecast precipitation to calculate "Fungicide Units," which account for fungicide residues weathering off of leaves during rain events. These models also give spray recommendations that incorporate cultivar susceptibility and fungicide sprayed.

Blitecast is used to time the first fungicide application on potato. Choose the weather station closest to your or the one that is most similar to the conditions found on your farm. Enter the earliest date that potato foliage was present in your area, usually the date that foliage emerged from overwintered potatoes in cull piles. When you click "get report" you will get a

Forecasted Late Blight Critical Threshold
Report Date: 6/7/2016 Location: New Bedford Crop: potato

The table below was designed to help you decide when to reapply fungicides for late blight. All tables will be updated daily. The information is from the Late Blight Decision Support System (DSS). To use this table, choose the date of your last fungicide application. Then find the fungicide you used last. The intersection of the two is the suggested date for your next fungicide application.

Last fungicide applied			Last spray date (month/day)						
			5/31	6/1	6/2	6/3	6/4	6/5	6/6
Active ingredient	Example fungicide product	Cultivar susceptibility[1]	Next spray date (month/day)						
chlorothalonil	Bravo WS	S	6/5	6/7	6/7	6/9	6/10	6/10	--
		mod S	6/6	6/7	6/7	6/11	6/12	6/11	--
		mod R	6/8	--	--	--	--	--	--
copper hydroxide	NuCop	S	6/5	6/7	6/7	6/9	6/9	6/10	6/13
		mod S	6/5	6/7	6/7	6/9	6/10	6/10	--
		mod R	6/7	6/12	--	--	--	--	--
cyazofamid	Ranman 400 SC	S	6/7	6/11	6/11	6/11	6/12	6/12	--
		mod S	6/7	6/12	6/12	--	--	--	--
		mod R	--	--	--	--	--	--	--
dimethomorph	Forum SC	S	6/5	6/7	6/7	6/11	6/11	6/12	--
		mod S	6/6	6/7	6/7	6/12	--	--	--
		mod R	6/8	--	--	--	--	--	--
fluopicolide	Presidio	S	6/7	6/11	6/11	6/11	6/12	6/12	--
		mod S	6/7	6/12	6/12	--	--	--	--
		mod R	--	--	--	--	--	--	--
mandipropamid	Revus	S	6/5	6/7	6/7	6/11	6/12	6/12	--
		mod S	6/7	6/12	6/12	--	--	--	--
		mod R	--	--	--	--	--	--	--
propamocarb	Previcur Flex SC	S	6/7	6/11	6/11	6/11	6/12	6/12	--
		mod S	6/7	6/12	6/12	--	--	--	--
		mod R	--	--	--	--	--	--	--

[1]S = susceptible mod S = moderately susceptible mod R = moderately resistent

The DSS works with weather and forecast data for the farm/field location specified. Next fungicide application dates in red are based on the first 72 hours of forecast weather. Next fungicide application dates in black are based on forecast weather data beyond the first 72 hours of the forecast. No date is specified when the suggested date is beyond the period when forecasts are available. Suggested application dates based on forecasted information may change if actual weather differs. Overhead irrigation and local variation in weather can also affect recommendations for a specific crop.

Be aware that missing weather data can influence the accuracy of the above information. One of the benefits of having a personal DSS account is that you will be informed about missing weather in your reports.

table showing actual and forecast severity values based on National Weather Service forecasts for the chosen weather station. Dates in the top row of the table in blue are based on actual weather data, while dates in yellow are based on forecast weather. When the 18 severity value threshold is reached or forecast, the box displaying the severity value number turns to red, indicating that a threshold has been reached. Apply a fungicide, as soon as you can after the threshold has been reached, to any potato fields with plants larger than 6-8 inches tall.

Simcast is used to time subsequent fungicide applications on potato and tomato and incorporates cultivar susceptibility and fungicide weathering. Spray recommendations are based on an assumption that chlorothalonil is the material being sprayed. Once you've chosen the nearest weather station and entered the information requested, click the "get report" button. On the report page you can see blight units increasing over time, and fungicide units decreasing over time, indicating fungicide residue being lost. Actual weather data is indicated in blue in the top row. Forecast weather is indicated by yellow for forecasts that include rainfall, and orange for forecasts that don't include rainfall. The National Weather Service only forecasts rainfall three days into the future. Once a treatment threshold is reached, for either Blight Units or Fungicide Units, a change in color to red will signal that the threshold has been reached, and a spray is recommended.

The Decision Support System (DSS) tells you exactly when to spray next based on when and what you last sprayed, based on past, current and forecast weather data. Pesticide recommendations can be obtained for both potato and tomato, and take into account the susceptibility of the cultivar. For the most accurate and site-specific late blight forecasts, growers can sign up for their own DSS accounts which are available for free–this allows you to enter more information about your specific weather conditions and irrigation history.

In addition to publishing a weekly pest report on late blight outbreaks and progress, Vegetable Notes readers have access to a MA-wide DSS website housing NEWA Decision Support System (DSS) output for each of our 41 NEWA weather stations, thanks to our colleagues at Cornell University who developed and maintain these resources. This is a really powerful tool—it takes the guesswork out of deciding when to spray and allows you to make fungicide applications only when needed based on pathogen biology and local weather conditions–and you don't even have to think about it!

Using the UMass DSS Web Page. Follow the link to: http://blight.eas.cornell.edu/blight/MA. First, choose the town closest to your farm and select potato or tomato based on the host crop of interest. You will then get output that looks like the figure on the previous page. To use the table, first choose the date you last sprayed, listed across the top of the table in green. Next choose the active ingredient or product that you last sprayed, listed along the left-hand side. The table includes six of the most commonly used fungicides for control of late blight, including copper hydroxide which can be used by certified organic growers and home gardeners. Next, choose whether the cultivar being grown is susceptible, moderately susceptible, or moderately resistant to late blight—follow these links to determine the susceptibility of commercial potato or tomato cultivars. The intersection of the last spray date column and the fungicide/host resistance row is your recommended spray date. Dates in red are based on past weather or weather forecast within the next three days and are thus more reliable. Dates in black are based on the last four days of the seven day forecast and are therefore less reliable. If no date is specified it means that a spray is not recommended within the period when weather forecasts are available. As mentioned earlier, the UMass DSS page is updated daily and recommendations will change just as the weather forecast does from day to day.

In recent years, late blight has driven spray programs for disease control in potato and tomato fields, but in the absence of this disease it is still important to manage early blight (*Alternaria solani*) and Septoria leaf spot (*Septoria lycopersici*). There is also a forecasting tool for these diseases known as Tomcast. According to this model, most parts of the state are still below the thresholds for initiating spray programs for these diseases. More details on Tomcast and managing fungal diseases of tomato and potato will appear in future issues of Vegetable Notes.

-by Susan B. Scheufele, UMass Extension

High tunnel survey

As part of University of New Hampshire's new Northeast SARE project "Improving nutrient and pest management in high tunnel production", we want to learn more about the practices used and challenges faced by growers using high tunnels. We ask you to help by please responding to the survey found at the link below.

https://unh.az1.qualtrics.com/SE/?SID=SV_5sZDRnBReS9vxNH

Your responses are crucial to help design research & outreach programs to provide the best resources for improving nutrient and pest management in high tunnels.

We know that it is a very busy time for growers, and we value your time. Our grower advisors assured us that this "did not take a ridiculous amount of time", and we have done our best to keep it short! All responses will be kept confidential.

We greatly appreciate your time and input,

Becky Sideman & Heather Bryant - University of New Hampshire Extension
Mark Hutton & Bruce Hoskins - University of Maine Extension
Margaret Skinner - University of Vermont
Eric Sideman - Maine Organic Farmers & Gardeners Association
John Spargo - Pennsylvania State University

Events

Special Topics for Pesticide Applicators

When: Wednesday June 15th, 2016 from 1:15pm to 3:30pm
Where: Doubletree Hotel, 11 Beaver Street, Milford, MA 01757

This two hour program will provide two recertification contact hours for all categories of pesticide licenses, Natalia P. Clifton, UMass Extension will discuss a variety of timely topics of importance to pesticide applicators. Topics will include EPA regulatory changes impacting pesticide applicators, events involving pesticide impacts on non-target organisms, resources for pesticide toxicity and environmental impact information, pesticide poisoning incidents, and the new draft MA state pollinator protection plan. Two pesticide contact hours for licenses in all Massachusetts categories. Contact hours are valid for equivalent categories in all New England states. The registration fee is $35.00 per person. Online registrations include an additional service fee.

For information on registering for these workshops please refer to our website at www.umass.edu/pested

Please contact Natalia Clifton, UMass Extension , 413-545-1044 or email nclifton@umass.edu

How to Conduct an On-Farm Trial

When: Tuesday, July 12th, 2016 from 3:00pm to 5:00pm
Where: UMass Crop and Animal Research and Education Center, 89 River Rd. Deerfield, MA

Ever want to apply for a SARE farmer or partnership grant? Looking to improve your farming practices through research? This workshop is for you! Farmers and Agricultural Service Providers welcome. We will provide hands-on training in setting up a replicated field plot, and include practice taking measurements and collecting data. Concepts learned can help you answer many questions through on-farm trials, but this workshop will focus on the UMass trial "**Nitrogen contribution from cover crops for vegetable crop uptake**" being conducted on multiple farms in Massachusetts this fall as a way to prepare cooperating farmers to conduct this trial.

Stay tuned for a follow-up workshop on data analysis and interpretation of results.

Free, but please RSVP: https://www.surveymonkey.com/r/OnFarmTrial

Questions? Contact: Katie Campbell-Nelson, kcampbel@umass.edu, 413-545-1051.

Supported in part by USDA/NE-SARE Professional Development MA State Program.

IPM Field Walks

In this series, learn to identify and scout for vegetable pests and select integrated pest management strategies that work for you, whether you are an experienced farmer, or just starting out, organically certified or not! We will use pheromone traps

to monitor pests, use a microscope to identify plant pathogens, and learn to scout in multiple vegetable crops with UMass Extension Vegetable Program staff Katie Campbell-Nelson, and Plant Diagnostician Angie Madeiras. Scouting will be followed by a discussion of effective control strategies with growers in attendance. Bring a hand lens if you have one.
Supported in part by funding provided by USDA-NIFA Extension Implementation Program, Award No. 2014-70006-22579

** *All field walks have been approved for 2 pesticide credits in the vegetable category*

June 28th, 4-6 pm
Wards Berry Farm, 614 South Main Street, Sharon, MA 02067
Farmer: Jim Ward

July 19th, 4-6pm
Alprilla Farm, 94 John Wise Avenue, Essex, MA 01929
Farmer: Noah Kellerman

August 2nd, 4-6pm
Red Fire Farm, 184 Meadow Rd, Montague, MA 01351
Farmer: Ryan Voiland

Questions? Contact: Katie Campbell-Nelson, kcampbel@umass.edu, 413-545-1051.

Sponsors

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