UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

Volume 28, Number 11 June 23, 2016

In this issue:

Crop conditions

The weather continues to be excellent for killing weeds! Nearly all of New England is experiencing very dry conditions and even moderate drought in some areas, and the forecast calls for more of the same. Folks have been spending a lot of time moving around irrigation pipes and hoses and hoping for some rain. The crops seem very happy for all the sun and reports of bumper crops abound! Strawberries seem endless, those early cucurbits are starting to really crank along, the heat is just enough to keep spring broccoli looking great and not button-y, flowers are coming on in fruiting crops, and the heat and sun bode well for the green tomatoes starting to appear in the field. Our first field walk of the season will be held next Tuesday in Sharon, MA; hope some of you can sneak away during this busy time to learn to identify and scout for common pests, and use that information to make decisions about managing your crops. Come see pheromone traps in action and scout a zone till pumpkin field. Angie Madeiras of the UMass Plant Diagnostic Lab will bring a microscope to look at diseases up close. It's so fun to see all those leaf spots in a new way—they really are all different!

Photo: left to right John Lebeaux, MDAR Commissioner; Daniel Sieger, MA Assistant Secretary for the Environment; and Kim Skyrm, State Apiary Inspector at the UMass Agricultural Learning Center.

June 20 - 26, 2016 is Massachusetts Pollinator Week!

Here are some resources for protecting honeybees and native pollinators:

New England Vegetable Management Guide
How to Reduce Bee Poisoning From Pesticides
Pesticide Environmental Stewardship
Pesticide Task Force of the NAPPC
EPA Actions to Protect Pollinators
The Xerces Society for Invertebrate Conservation

Pest alerts

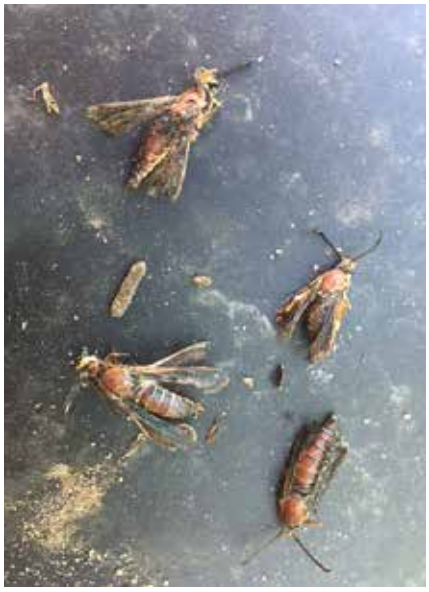
Alliums: Onion thrips adults and nymphs continue to be present at threshold in some MA fields despite treatment with some organic materials. Pyganic and Entrust are effective but have a shelf life of 1 year. Repeat insecticide applications every 7-10 days, using shorter intervals in hot dry weather for most materials. Make applications in early evening when thrips are emerging out of allium necks to feed on foliage. Use high pressure and 100gal water/A for best results. Thrips damage can look like Botrytis leaf blight, as feeding scars enlarge as leaves grow forming large white spots. Plants with these symtpoms have been submitted to diagnostic labs in VT and MA but no disease has been found. Over-wintered onions harvested from low tunnels are coming out disease free—the warm dry weather has not been conducive to disease development.

Brassicas: Imported cabbage worm adults, eggs and larvae are still being found in fields across MA but all below threshold.

Cucurbits: Evidence of bacterial wilt is now being seen in cucurbit fields in Franklin Co., MA which had high striped cucumber beetle pressure earlier in the year. This disease is vectored by striped cucumber beetles. Scout for beetles on 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.

Squash vine borer adults are now being trapped in high numbers and will be laying eggs on susceptible crops. Damage will likely be seen in summer squash and zucchini within the next 10 days when eggs hatch. Treatment thresholds are 1 moth per week for organic growers, 5 moths per week for non-vining crops and 12 moths per week for vining crops. Only make treatments based on scouting or trap captures since pressure varies greatly from field to field even in the same town. One trapping location in Hillsborough Co. NH captured 45 moths this week! See article this issue for more information and photos.



Squash vine borer adults from a trap in Easton, MA this week. Photo, K. O'Dwyer.

Table 1. Accumulated Growing Degree Days (F): 1/1/16 - 6/21/16

Location	GDD (base 50F)
Western, MA	
Ashfield	560.2
South Deerfield	656
Pittsfield	533.6
Central, MA	
Bolton	653.6
Northbridge	613.6
Phillipston	552.6
Eastern, MA	
Ipswich	546.4
Seekonk	723
Hollis, NH	631.4
Burlington, VT	687
Newport, RI	578.7

Solonaceous: Broad mite was confirmed on pepper from a greenhouse in Chittenden Co., VT. Symptoms include curling, twisting, torn and misshapen leaves with the growing tips severely diminished. On pepper and eggplant fruits, symptoms include scaring and russetting often right at the stem end. This pest is difficult to identify because it requires high magnification under a microscope to see. Submit samples for diagnosis to your local diagnostic lab if you suspect damage. Reports of the Dickeya strain of black leg of potato continue to come in and so far the list of varieties affected includes: Norwis, Reba, Kennebec, Superior, Waneta, Vivaldi, and Snowden. The first generation of Colorado potato beetle is progressing, with 2nd and 4th instars found at threshold in Franklin, Hampshire and Bristol Cos., MA. The treatment threshold for large larvae is 35 on 25 stalks scouted (~1.5 larvae per stalk), or 4 small larvae per stalk.

Sweet Corn: European corn borer – While peak flight is published to occur at 631 GDD base 50F, most trapping locations were capturing more moths in the last 2 weeks than they are now despite GDDs lower than 631 base 50F (Table 1). The first peak flight of this pest is over in most New England locations trapping except for Tyngsborough, MA (Table 2). Scouts are reporting more ECB moths captured than the past few years in NH while numbers have been lower this year in NY. A 15% threshold for ECB infestation has been reached in one field in NH, but numbers are mostly below threshold in other states. Fall armyworm

Table 2. Sweet corn pheromone trap captures week of 6/15/16-6/22/16

Location	ECB	FAW	CEW	Spray Interval for CEW
Western, MA				
Amherst	5	.	.	*NA*
Sheffield	0	.	.	*NA*
South Deerfield	1	1	.	*NA*
Whately	1	0	.	*NA*
Central, MA				
Bolton	5	.	.	*NA*
Leominster	0	.	0	*no spray*
Eastern, MA				
Concord	0	0	0	*no spray*
Haverhill	0	0	0	*no spray*
Ipswich	0	0	1	*no spray*
Millis	0	.	.	*NA*
Swansea	5	.	3	*5 days*
Tyngsborough	11	0	9	*4 days*
NH				
Litchfield	0	.	.	*NA*
Hollis	8	0	4	*5 days*
Mason	0	.	.	*NA*
Cortland Co., NY	0	0	0	*no spray*
Washington Co., RI	1	.	2	*6 days*

is present in pre-tasseling corn at one trapping location in MA, and at this time it is important to scout in whorl stage corn. Corn earworm is being captured now in RI, NH, and NY in silking corn at spray thresholds (Table 2). If you have not done so already, it is time to put out CEW traps in your silking sweet corn.

Multiple Crops: **Aphids** of several species have been reported widely across MA on recently transplanted peppers, tomato, cucurbits, established potatoes and weeds such as lambsquarter. Reflective mulch has been shown to repel aphids. The black aphids found on lambsquarter are not considered a pest to vegetable crops and serve as a bank for beneficial predatory insects such as lady beetles, which will also feed on aphid pests such as the Green Peach Aphid, Potato Aphid and Melon aphid. Because aphids vector viruses, insecticides targeting aphid nervous systems such as pyrethrum, spinosad or neonicitinoids are not recommended because these materials enhance aphid probing before they die, rapidly vectoring viruses from one plant to another. Materials that smother the aphids such as insecticidal soaps or horticultural oils are better for killing aphids in place once they reach the following thresholds when scouting a whole field:

Cucurbits: Scout 5 leaves at 10 sites. Treat if 20% of leaves have >5 aphids.

Pepper: Scout 3 leaves on 30 plants. Treat at 10 aphids/leaf before fruit set and 5 aphids/leaf after fruit set.

Potato: Scout 3 leaves per site at 10 sites. Treat if 50% of leaves have >5 aphids.

Tomato: Scout 3 leaves per plant (low, medium and high) on 25 plants. Treat if >5 aphids/leaf.

Potato leafhopper adults are being found all over New England though nymphs have not yet been observed. Definitely time to start scouting potato, beans, and eggplant and treat at a threshold of 1 adult per stalk on potato or 1 adult per plant in beans, and 1.5 per leaf in eggplant.

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

Squash vine borer larva. Photo, A. Eaton

MANAGING SQUASH VINE BORER

Squash vine borer moths are now being caught in pheromone traps in MA and NH with one Hillsborough Co., NH location capturing 45 moths in one week. Populations vary greatly from site to site even within the same town, so only make treatments based on scouting or trap captures.

Squash vine borer adult. Photo, J. Boucher

Life stages and identification. Squash vine borer adults are day-flying moths with a 1- to 1.5-inch wingspan, black forewings, clear hind wings, and a bright red-orange abdomen. In flight, they can look like wasps. There are 1-2 generations each year in New England. First generation adults emerge mid-June to early July, and peak flight is in mid-July. Over the last few years, we have been trapping adults in pheromone traps at 450-500 GDD base 50F in NH and MA. A second generation in late August has been indicated by trap captures in seasons with particularly high degree day accumulation. Moths usually fly for a couple of weeks before beginning to lay eggs, and their lifecycle lasts about 60 days. Eggs are small (~1mm) ovals, reddish brown in color, and are usually found singly on squash vines, within a foot of the soil. Eggs hatch in 10-15 days. Larvae are cream-colored, about 1 inch long, and have a brown head capsule. Within hours of hatching, the larvae bore into stems, where they feed for 4-6 weeks before exiting to drop into soil, spin a brown cocoon, and pupate not far below the surface. They remain in the soil until the following spring, or may hatch as adults for a second flight in late summer.

Squash vine borer egg. Photo, K. Campbell-Nelson

Host crops and damage. Larval feeding within vines causes leaf stems to wilt and collapse, reducing fruit yields, and can even sever a plant from its roots. Occasionally larvae will bore into fruit of hard squash and pumpkins. Thick-stemmed Cucurbita species including *Cucurbita pepo* (summer squash, zucchini, pumpkin) and *C. max-*

ima type winter squashes (e.g. Hubbard, Buttercup) are preferred and are most suitable for larval development. Pumpkins can sustain high infestations without yield reduction. Generally, vining plants can withstand higher infestations compared to bush-type plants, as they tend to root at the vine nodes, allowing the vine to survive despite having borers within the stem. Butternut squash, cucumber and melon are considered resistant to this pest.

Cultural strategies. Crop rotation can be an effective strategy to reduce damage, as it will take emerging adults longer to find and lay eggs within a host crop. Move cucurbit plantings to distant fields year to year, and do not plant this year's summer squash into last fall's pumpkin field. Fall or spring plowing can destroy or bury pupae, and subsequently reduce populations. Row covers may prevent egg-laying, but may also interfere with pollination. Trapping data indicating the presence of adults and peak flight may help determine when row covers are necessary, so that covers can be removed for pollination when plants are at less risk of infestation. In highly infested fields, summer squash may be used effectively as a trap crop because they are a preferred host. Straw mulch near the base of plants also keeps the adult moths from laying eggs.

Monitoring. Pheromone traps can be used to monitor adult flight (Heliothis net traps work best; sources for traps and pheromone lures include Gempler's, Great Lakes IPM, Trece). Traps should be placed in a susceptible crop, with the bottom of the trap just above, but not blocked by, the plant canopy. Traps may have to be moved up as the plants grow. Once the first adult moths are captured, check the bases of stems for eggs (photo), sawdust yellow-orange frass, or entry holes of larvae. Cutting open the stem just above the hole is a good way to find out if damage has just begun or if the larvae are already well developed in the field. If the damage has just begun, it may still be early enough that a spray targeted at the base of plants will control hatching larvae.

Chemical control. Targeting stems before eggs hatch and larvae as they hatch is important for effective control because the larvae can't be reached once they have bored deep into the stems. A working threshold when using organic products is 1 adult per trap per week, starting within a week of seeing the first adult, according to a 2013 Rutgers Extension publication. When using conventional products, the threshold is 5 adults per trap per week for bush varieties. For vining crops, the plants may be able to tolerate more damage and the threshold can be higher. A 2014 fact sheet from UNH suggests a threshold of 12 moths per trap per week for vining-type squash or pumpkins. A total of 2 to 3 applications 5-7 days apart targeted at the plant base may be necessary for as long as adults are being caught in traps. See New England Vegetable Management Guide for treatment options. Many of the insecticides labeled for this pest are broad-spectrum materials with high toxicity to bees and are not recommended for use during bloom when the vine borer is active. Squash bees and bumble bees may spend the night inside of blossoms, so targeting sprays at the base of plants, rather than at blossoms and foliage, can also help to protect pollinators. Several selective products labeled for cucurbits (with low or medium bee toxicity) including spinetoram (Radiant), spinosad (Entrust), and Bacillus thuringiensis are labeled for squash crops and have been shown in trials to provide control when used as described above. Bt aizawi (Xentari) was somewhat more effective than Bt kurstaki (Dipel) or spinosad in some trials. Injecting entomopathogenic nematodes Steinernema carpocapsae into cucurbit stems near the base of the plants has been shown to be effective and the hollow moist vines are conducive to survival of the nematodes.

--updated for 2016 by Katie Campbell-Nelson from article by Ruth Hazzard, UMass Extension Vegetable Program.

Resources:

Canhilal, R., G. R. Carner, R. P Griffin, D. M. Jackson, and D. R Alvarez. 2006. Life history of the squash vine borer, Melittia cucurbitae (Harris) (Lepidoptera: Sesiidae) in South Carolina. The Journal of Agricultural and Urban Entomology 23: 1–7. (Available online at:http://scentsoc.org/Volumes/JAUE/v23/1.pdf) (verified 27 June 2011).

Capinera, J.L. 2001. Handbook of Vegetable Pests. Academic Press, New York. 729 pp.

LEAF SPOTS OF CUCURBITS

There are several diseases that cause leaf spots on these crops and they can often be hard to tell apart. Below are descriptions of some the more common fungal and bacterial leaf spots found on cucurbit crops in MA that we hope will help you tease them apart in the field. Of course a diagnosis from a trained pathologist in the lab is ideal, but we understand it is not always possible to test every spot you encounter.

Angular leaf spot can affect all cucurbits, but cucumbers are most commonly affected. It is caused by the bacterium *Pseudomonas syringae* pv. *lachrymans*. This disease is usually among the first to show up because it is seed-borne. It will start to appear in the early to mid-season. Small, round water-soaked spots appear on leaf tissue, and expand until they are confined by veins, giving them the characteristic angular look. Under moist conditions a milky white exudate containing bacterial cells may ooze out of the lesion on the lower leaf surface. These wet-looking spots will dry out and turn yellow-brown or the dead tissue may fall out leaving a "shot-hole" appearance. Yellowing of the leaf between lesions may occur where disease severity is high. Similarly, water-soaked spots may appear on stems and petioles, drying out to form a whitish crust. Spots can also appear on fruit, where they are tiny and water-soaked but dry to form whitish, chalky, spots. These spots cause internal decay of fruit, and fruit that is infected early may be deformed. Affected plants will grow poorly, produce less fruit, and affected fruit is unmarketable.

Angular leaf spot on zucchini. Photo, S. Scheufele

As with other bacterial diseases, outbreaks of angular leaf spot are often initiated from infected seed. Bacteria proliferate in warm, moist weather and are spread from plant to plant by water, commonly in the form of splashing rain or runoff, as well as by insects or workers moving through the field.

Use drip irrigation to reduce spread of bacteria by overhead irrigation. Don't work in wet fields or work in clean sections of the field first and infected sections last to avoid spreading the disease to unaffected areas or to new plantings.

If you catch the disease early, before it is widespread and severe, copper may be effective in reducing its spread. Till in residues quickly after harvest to get that infected tissue breaking down quickly. Bacteria survive on residues as long as it is present, up to two years. Resistant varieties are available.

Anthracnose affects mostly melons, watermelons and cucumbers; squash and pumpkins are less susceptible. The disease is caused by the fungus *Colletotrichum orbiculare* which, like other anthracnose fungi, causes characteristic black, sunken lesions on affected fruit. Leaf spots are light brown or reddish and appear near veins so may cause leaf distortion. These lesions dry out and the dead issue may fall out, again leaving a "shot-hole" appearance. On stems and petioles, lesions are elongated and tan. The fruit lesions are large, circular, sunken areas that turn black and may produce a pink ooze under humid or moist conditions.

Anthracnose on watermelon. Photo, OMAFRA

The fungus can be seed-borne and also survives on crop residue or volunteer plants (maybe in your compost or cull pile?). Humid, rainy weather is necessary for disease to occur. There are three races of the fungus that affect different crops. Resistant cucumber and watermelon varieties are available, but there are no resistant melon varieties. There are many fungicides labeled for control of anthracnose; please see the New England Vegetable Management Guide for recommendations.

Alternaria leaf spot affects all cucurbit crops but is most common on cantaloupe. The disease is caused by the fungus *Alternaria cucumerina* which, like other *Alternaria* species, can cause a characteristic target-like spot. Usually, leaf spots start out as small tan flecks that enlarge and merge together. These larger spots (up to a half inch) may exhibit the concentric rings common of *Alternaria* fungi.

This disease usually occurs in mid-season and can reduce late-season fruit production. Fruit lesions may also occur–they appear as zonate, sunken lesions with dark, olive-green, felt-like sporulation present. The fungus survives on crop residue in the soil as long as it is present. A two year rotation away from cucurbit hosts is usually sufficient.

Alternaria on cantaloupe. Photo, G. Holmes

Septoria leaf spot is less common, occurring in cool summers or late fall. The

disease is caused by the fungus *Septoria cucurbitacearum* which creates small, almost white round spots on leaves and superficial raised tan bumps on fruit. The fungus survives on crop residue in the soil which persists one to two years. Spores are spread from plant to plant via splashing rain or overhead irrigation.

Scab on zucchini. Photo, T. Zitter

Scab can be a significant problem for summer and winter squash, pumpkin, melon, and watermelon. Lesions may occur on leaves, stems, petioles, and fruit, with fruit spots being the most damaging. Leaf spots are small, pale-yellow to white, and again the dead tissue in the center of the lesion may fall out leaving a "shot-hole" appearance. Leaf lesions may not occur. Lesions on stems are elongate and light colored, and if numerous may cause the internodes to shorten, giving the plant a deformed virus-like appearance. Scab lesions on fruit are sunken, irregular cavities with corky margins, and may produce a golden brown ooze which dries into brown beads. Sporulation on lesions may occur, giving them an olive-green, felt-like appearance.

This disease usually occurs in mid-summer and is favored by cool dry days and rainy or dewy nights. The pathogen survives in crop residues which persist one to two years in soil. Tolerant varieties of cucumber are available. Chlorothalonil, mancozeb, or polyoxin D can be used preventively, at the first sign of disease.

--Written by Susan B. Scheufele, 2015, updated 2016

DOSER FOR SMALL SCALE VEGETABLE WASHING WITH SANITIZER

-by Chris Callahan, Extension Agricultural Engineer at the University of Vermont.

[Lisa McKeag Ed. Note] Chris' work focuses on infrastructure and equipment that meets the needs of relatively small-scale food producers and processors. Find more information on his work on greenhouse heating, vegetable storage facilities and more on his blog: http://blog.uvm.edu/cwcallah/*. This design for a homemade device for measuring small quantities of wash water sanitizers can also be found there.*

I recently put together a simple doser for manually measuring accurate doses of sanitizer into wash water solutions. It is really just a homemade burette. The process of mixing a treatment dose of sanitizer requires metering a specific dose of concentrate into a larger volume of water. I have also created a calculator to help with that. The UVM Extension Produce Safety Program maintains a great set of resources for general guidance on use of sanitizers including this guide sheet. It is important to always have a copy of the official product "label" (not necessarily the same thing as the label on the container). For easy reference, labels for typical sanitizers are linked below. Please check with your supplier to be sure you have the most recent version for the product you are using and the intended application.

- Clorox Regular – Germicidal Bleach
- Sanidate 5.0
- Tsunami 100
- VigorOx 15 F&V

There are a number of options available to avoid actually pouring these chemicals when dosing a mix tank. You can download a summary of these options here. When pouring them, splashing and spills can occur which are best avoided due to the corrosive and hazardous nature of the chemicals at stored concentrations. Even when using enclosed dispensing options, wear proper personal protective equipment including goggles and resistant gloves in case there are unexpected leaks or spills.

Some of the dispensing options available include:

- Dosatron – $940-$1000 – Allows for injection of sanitizing chemical directly into the flow stream of water being used in the process. Measurement is done by adjusting flow ratio similar to a fertigation system.
- Goat Throat – $299 – GoatThroat 300 Pump with Viton seals. Allows a manual, enclosed pumping with integral valve. No closed measurement.
- EnviroSelect Dispensing Pump (BioSafe Safety Value Pack) – $75 – Allows a manual pumping of liquid directly from container without pouring. No integral valve, and no closed measurement.

When I reviewed these options, I felt there was still a need for something at the lower end of use volume. Something that would work for 30 to 300 gallon washing batches. So that is why I put together the assembly described below, with a parts cost of less than $50 and assembly time of less than 1 hour. It is also posted on FarmHack – let me know what you think, and feel free to join in the design discussion on FarmHack.

With two quarter-turn spigot valves, a 2-foot length of Teflon tube and some electrical tape you can accurately and safely measure and dispense up to 300 mL (10 fl. oz.) of chemical in 10 mL (0.3 fl. oz.) increments. In 100 gallons of water, +/- 10 ML translates to +/- 3 PPM of Sanidate 5.0, +/- 8 PPM of Tsunami 100, or +/- 3 PPM of Chlorox Bleach.

I've included only Teflon parts for wetted surfaces below based on material compatibility guidance for peroxyacetic acid, the active ingredient in Sanidate and Tsunami. The product is shipped in polypropylene containers which seems to handle it, but may also only do so for limited periods of time. This doser will see several dozen containers worth of solution in its life, so I think the extra expense for Teflon is worth some added life.

Materials List

Quantity	Material	Approximate Cost
1	Threaded industrial screw cap for tote. Either 70mm (2-3/4 inch) (for 5 gal tote), 61mm (2-3/8 inch) or 51mm (2 inch) (for 2.5 gal tote), either with 3/4" threaded reducer.	$1.00
2	¼ Turn 3/4" Male NPT threaded PTFE (Teflon™) Spigot Valve	$10.00 x 2 = $20.00
1	24" L x 1" ID Teflon™ FEP Tubing	$21.72
2	11/16" to 1-1/4" Hose Clamps	$1.79 x 2 = $3.58
1	3/4" Female NPT threaded to 3/4" barb ID hose barb	$3.00
1	to length - 3/4" ID, 1" OD hose for ease of dispensing.	10 feet, $9.00
As needed	Electrical tape, cut in thin strips x 3-1/2" long. Or use a permanent marker to make increment markings (e.g., Sharpie TM)	$1.50
Materials for mounting the doser		
1	Scrap piece of wood to mount on	na
4	Zip ties or..	25 pack, $6.49
2	Mounting clip or..	$1.29 x 2 = $2.58
~16 inches	Strap roll	25 feet, $4.29

** All links above are offered as examples; no endorsement or preference is intended.

To Build

1. Start by cutting a few strips of electrical tape about 1/16" thick and 3-1/4" long. This length wraps almost completely around the tube and these strips will be your level markings. You can also use a permanent marker such as a Sharpie(TM).
2. Attach one valve to the threaded reducer cap, and tighten securely.
3. Next start assembling your tube. I bought a 24inch piece of 1inch ID Teflon tubing. This provides about 300 mL of dosing capacity as noted above. This tubing will slip right over the red end of the Teflon valve noted in the material list above, and can be secured with a hose clamp. Only attach one valve at this time, and make sure it is in the closed position.
4. Measure 50 mL of water using a measuring cup. You can use other incremental measures, e.g. 10 mL, 20 mL, etc. In fact, if you have a few doses you routinely use that are odd measures, consider marking those also and labeling them to help the user do it the same way every time. Pour the incremental measure into your tube and hold it plumb.
5. Attach a strip of tape at the water level for the first increment or mark with a marker.
6. Repeat for additional increments of water, and/or mark specific odd measurements for common dosing mixtures that you use.
7. Ensure the other valve is in the closed position. Attach it to the chemical container (which should have a 3/4" NPT fitting to match the valve.) Take care to have the container in an upright position to prevent spills.
8. Attach the measurement tube to the valve you just connected to the chemical container and secure with a hose clamp. Don't hesitate to torque these hose clamps down. I'm looking for an adhesive or sealant that will work with the Teflon materials to improve this connection. But this is the best I have for now.
9. Consider mounting the measurement assembly to a piece of scrap wood to make it more stable. This may require you laying out the location relative to where you chemical is stored and where you plan to dispense to. I've listed several mounting options above.
10. Consider attaching a hose to the bottom (exit) valve using a hose barb attachment to make dispensing easier and less prone to spills.

To Use

- Ensure the bottom valve is closed (these could be better color coded, perhaps a black Sharpie to fill in the side of the valve handle that shows when closed and leave the other one as is (red)). Direct dispensing hose to the wash tank or an intermediate container.
- Open the top valve slowly and carefully to dispense the required dose into the measurement tube.
- Close the top valve.
- Confirm the discharge hose is directed where you want the chemical to go.
- Open the bottom valve and allow chemical to dispense.
- Close the bottom valve.
- Check for leaks and repair as needed.
- Wash hands.

Attaching tubing to valve

Tubing secured with hose clamp

Cutting the electrical tape for increment markings

Attaching tape at first increment

The finished doser

Events

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*

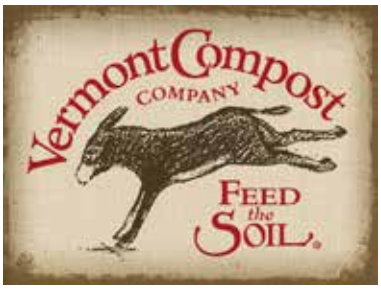
June 28th, 4-6 pm
Wards Berry Farm, 614 South Main Street, Sharon, MA 02067
Farmer: Jim Ward

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.