Cornell University Cooperative Extension

Eastern NY Commercial Horticulture Program

Weekly Vegetable Update

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Welcome Cara Fraver and Lindsey Pashow ENYCHP Summer Technicians!

I am happy to welcome Cara Fraver and Lindsey Pashow to our team! They will be working with various educators around the region so don't be surprised if you see them on your farm checking traps, scouting or helping out with a research project. Cara will be working mostly in the immediate Capital District and lower Hudson Valley on vegetable and small fruit crops while Lindsey will be assisting Amy Ivy and new hire Anna Wallis in the North Country with tree fruit and grapes predominantly. We have asked them both to introduce themselves below and hope you will welcome them to our team too.

Cara Fraver: I'm enthusiastic to be spending the season working with the ENYCHP as a Summer Technician. For a few years, my husband, Luke Deikis, and I have been growing diversified vegetables for farmers' markets and Community Supported Agriculture at Quincy Farm in Washington County. In the three years that we raised vegetables at Quincy Farm, we more than doubled in size and ended with four strong summer markets, three great winter markets and a 75 member CSA. I am very excited for my new role with the ENYCHP, to learn from trials and farm visits and to work with this great group of educators and growers.

Prior to farming on our own, we worked at Roxbury Farm in Kinderhook, NY and Hearty Roots Farm in Claverack, NY. Before we began growing vegetables for sale, I worked for many years at Just Food, the non-profit that coordinates CSA's in New York City. I set up Just Food's Fresh Food For All program Prior to that, I organized a new CSA in Ravenswood, Queens, which evolved to become the thriving Hellgate CSA.

Lindsey Pashow: I'm a seasonal Field Technician for the northern region of the CCE Eastern NY Commercial Horticulture Program. Last year I worked as a Field Technician for CCE on the cold hardy wine grape trial at Cornell's research farm in Willsboro with Kevin Iungerman, and prior to that I was a volunteer on the project for two seasons. I currently own a small wine grape vineyard called Adirondack View Vineyard in Keeseville, NY.

In addition to grapes I'm also helping with a bio-control research project led by Elson Shields that is studying the use of native beneficial nematodes to control root feeding weevils on strawberries in northern NY, coordinating some programs for apple growers in our area, and helping out where needed. I'm excited to be working for Cooperative Extension in a broader capacity this season!

Be on the Lookout for Seedcorn Maggots

Although this spring has been relatively dry so far and crop planting is progressing, things can change quickly as we all know. It appears that we are heading into a rainy period with rain showers predicted all week into the weekend with 1/2" to 3/4" predicted for each day. With that said, Seedcorn maggot should be one of the pests to be on the lookout for. I came across a really nice article written by our colleagues in Massachusetts and thought it would be worth sharing with all of you. I think there are a couple take home messages in this article summarized at the end. When the situations that favor seedcorn maggots cannot be avoided (see article below) seed treatments, where applicable, will be your first line of defense and depending on the crop, there are labeled in-furrow applications as well. Table 1 gives you the Growing Degree Days (GDDs) needed for the different seedcorn maggot generation emergences. Table 2 gives you an idea of where we are with GDDs within the ENYCHP region for the first generation seedcorn maggot emergence. -*CDB*

Seedcorn larvae (maggots).
Photo by University of Illinois

Cool soils and fresh organic matter favor seedcorn maggots

Source: UMASS Vegetable Notes, Volume 26, No. 5, edited by Chuck Bornt, CCE ENYCHP

Seedcorn maggot *(Delia platura)* larvae feed on the seeds and young seedlings of a wide variety of vegetable crops. The first plantings of large-seeded crops such as corn, beans, and peas are often attacked, as well as early seedlings of spinach, onions, brassicas, tomato, cucurbits, and others. The first symptoms are usually poor germination (or failure of seedlings to emerge), or wilting of transplants that have lost their roots to feeding. Symptoms can be difficult to distinguish from other problems, such as damping off due to Pythium and other soilborne fungi, or wireworm feeding. Symptoms may be similar to damage caused by the cabbage or onion maggot, but seedcorn maggot becomes active two or more weeks earlier in the spring. Prevention is key in managing this pest. By the time you see damage, it is too late to control the problem using either cultural or chemical methods.

If seedcorn maggots are the culprit, maggots can usually be found in the soil around and inside seedlings and seeds. The seedcorn maggot is yellow-white, up to 1/4 inch long, legless, and has a wedge-shaped head. Pupae are oblong, brown, and about 4-5mm long. Seedcorn maggots overwinter as pupae in the soil where they had fed and developed the previous fall. In early spring, the adults emerge and lay eggs on the soil surface. They are attracted to volatiles released from freshly tilled soil, as well as to buried cover crop residues, rotting manure, compost, organic surface residues (as is found in reduced till), and organic amendments such as fish, soybean or cottonseed meal. Previously injured or diseased plants may also attract egg-laying. The eggs hatch within 2-4 days at soil temperatures of 60°F, and 7-9 days at 41-45°F. Larvae burrow downward in search of food and penetrate seeds as the seed coat splits open.

Emergence can be estimated using cumulative growing degree days, starting January 1st. Degree days can be calculated on a daily basis by using the formula: [(Max temp – Min temp)/2] – base temperature. To use GDD accurately, it is important to keep track of whether you are in Farenheit or Celsius, and to use a base temperature suited to the insect (or plant) of interest. Scientists have determined the accumulated GDD required for seedcorn maggot to reach peak adult emergence for first, second and third generation flies. This model is based on GDD accumulated since January 1st at base 40°F/4°C. *(Editor's note: Please see Table 2 for a list of accumulated GDDs at Base 40^0 F for various locations throughout eastern NY.)*

It is the first generation that causes the most damage. Crops that are planted in wet soil, or soil that is too cool to support quick germination and seedling growth, are especially susceptible to damage. Seedlings are sometimes able compensate and recover from seedcorn maggot injury, depending on: the number of larvae per plant, which crop

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Table 1: Growing Degree Days (GDDs) for different seedcorn maggot generation emergences (at base 40^o Fahrenheit)

First Generation	Second Generation	Third Generation
360	1,080	1,800

Table 2: Accumulated Growing Degree Days for Seedcorn Maggot Emergence at base 40^o F since January 1, 2014 for selected sites within the ENYCHP area.

Location	Accumulated GDDs (F^o)	Location	Accumulated GDDs (F^o)
Albany	240	Highland	307
Castleton	252	Hudson	275
Clintondale	303	Montgomery	264
Glens Falls	205	Peru	157

Be on the Lookout for Seedcorn Maggots, continued from p. 2

(eg. cantelope is less able to recover than bean or corn), seedling size, and growth conditions. Conditions that favor crop emergence and growth help seeds and seedlings escape or recover from injury.

Management strategies:

⇒ Avoid seeding fields (especially wet fields) too early. Seeds germinate more quickly and are less vulnerable in warmer soils. Be patient! Check soil temperatures and use forecasts to determine likely soil conditions for emergence.

⇒ Disk and incorporate organic matter (such as a cover crop) at least 4 weeks before seeding to give it time to breakdown and make it less attractive to the flies.

⇒ Avoid applying manure or unfinished compost in late fall or early spring to heavy soils that you might want to plant early. Lighter, well-drained, sandy soils are less likely to have problems (because they warm up faster than others).

⇒ Row covers can help – but only if the maggot flies are coming from elsewhere. Damage can occur if the flies have overwintered in the soil and thus end up underneath the row covers. Avoid covering seedlings that were planted into recently incorporated, lush cover crops.

⇒ If you need to replant, wait at least 5 days if maggots that you find are a quarter inch long; if they are smaller than that, wait at least 10 days to make sure they have pupated and will not damage the new seeds.

Good Habit: In the past few years the availability of digital pictures and their use in crop loss justification has risen dramatically and has proven to be quite useful. Just like saving seed in case you have a problem with your stand, it is wise to take regular pictures (weekly, if possible) of your crop throughout the growing season. If weekly is not possible, go by predictions of potentially injurious weather. Bad weather incidents can be better measured if there is a "before" picture. No, it really can't be used to justify a potential yield, officially, but it can be a great indicator of losses. *-MRU*

Monitoring Greenhouse pH, EC and Water Source Alkalinity

Last week I wrote about managing pH and Alkalinity and as promised, this week I am providing information from Professor Neil Mattson of Cornell University on methods of testing pH and EC (Electro Conductivity). Please note that Neil Mattson will be providing workshops on these topics, at no charge on May 6th and 7th at two locations (see announcement on last page of this newsletter-registration information after this article). This is an excellent opportunity to fine tune your greenhouse fertility, water quality, and media management.

The following is excerpted from Neil's bulletin:
<u>Testing Container Media for pH and Salts</u>

Calibrating EC and pH Pens

The readouts from pH and EC pens tend to drift over time. Therefore, the pens should be calibrated before each use to ensure that they give consistent results. To calibrate the pens you will need pH 4 and 7 buffer solution; and an EC standard solution (these can be obtained from greenhouse and agriculture supply companies).

The specific instructions for calibrating can differ depending on the brand of pen. For most EC meters you will place the pen in a cup that contains the solution (enough for the solution to completely immerse the sensor tip) and wait a few seconds for a stable reading. Then you will turn a small screw until the display gives the proper value. Most pH meters will require a "two point" calibration using both pH 4 and pH 7 buffer solutions. Following the manufacturer's instructions, you will place the pH pen in one of the buffer solutions, wait for a stable reading then press a button or adjust a screw until the display gives the proper value. You will then repeat with the other buffer solution.

Direct Measurements

The EC and pH pens can be used to directly measure water samples without any special sample preparation. To measure pH/EC, fill a small cup with enough water to completely immerse the sensor tip of the pH pen. Remember to rinse the sensor tip of the pen with distilled water before measuring another sample. Some water samples that you might choose to directly measure the pH include: your source water, fertilizer water that will be applied to plants, or pesticide solutions. (Some pesticides lose their effectiveness if the pH is too high).

By measuring your source water and fertilizer solution you can check that the fertilizer injector is working correctly. The procedure is:

1) determine the EC of your source water (without fertilizer)
2) determine the EC of your fertilizer solution after the injector has been running for several minutes
3) subtract the EC of your source water from the EC of the fertilizer solution
4) compare this EC to the table on the fertilizer bag.

If there is a large discrepancy it means that either the fertilizer solution was not mixed correctly in the stock tank; or the injector may need to be calibrated (i.e. it may not be taking up fertilizer at the proportion that you set).

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PourThru Method

This is the simplest method for obtaining a solution sample from container media. An advantage of this method is that you are simply collecting a leachate from each container and you do not need to directly sample container media and disturb the plant. Measurements tend to vary quite a bit between containers; so it is recommended that you take measurements from 5-10 containers and use the average value.

Steps for the PourThru method

- water containers to saturation (so that a few drops of water come out of the bottom of the container) with the normal irrigation water they have been receiving
- after container has drained for one hour, place a saucer under the container
- pour enough distilled (DI) water on the surface of the container to get 50 mL (1.5 fluid ounces) of leachate to come out of the bottom of the container
- collect leachate for pH and EC testing
- calibrate pH and EC meters
- measure pH and EC of samples

More information about the PourThru method is available online at http://www.pourthruinfo.com

1:2 Dilution Method

In this method you will need to sample medium from the container. So you will need to disturb the plant/container. This is also a good time to inspect the plant's root system. A small or diseased root system may not be able to absorb adequate amounts of water and nutrients for the plant.

Media sampling for the 1:2 Dilution Method

- take slices/cores/handfuls of media from the area where roots are actively growing
  - avoid taking sample from the top one-third of the media where salts tend to accumulate
- take samples from 5-10 representative plants
  - or in case of a disorder: from a problem plant and separate sample to compare to a healthy plant
- pool the samples together
- spread the sample on a pan and allow the sample to air dry for 24 hours
- remove large debris from the sample

Obtaining a solution from the air dried media sample

- combine 1 part media and add 2 parts distilled water by volume and combine these in a jar or plastic cup
- mix thoroughly and allow the mixture to stand for 30 minutes
- use coffee filter and a funnel to filter the mixture while you pour the sample into a small cup
- measure pH and EC

INTERPRETING TEST DATA

EC (Electrical Conductivity)

The values that you measure for EC will depend on the method you use for testing the container media. General guidelines for interpreting the EC test are provided in the table at the bottom of this page for the most common sampling methods.

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pH and Alkalinity Definitions

Alkalinity the ability of water to neutralize acids which is due to the presence of dissolved alkalis: $Ca(HCO_3)_2$, $NaHCO_3$, $Mg(HCO_3)2$, $CaCO_3$. Do not confuse with the term "Alkaline" which means pH level greater than 7. Alkalinity is reported in terms of ppm $CaCO_3$ (or meq, in which case: 50 ppm = 1 meq $CaCO_3$)

Buffer Solution These are reference solutions that contain a specific pH value – typically pH 4.0 and 7.0. These are used to calibrate pH meters to make sure they are measuring correctly.

Calibration involves checking the accuracy of the pH meter using buffer solutions and the EC meter using a standard solution. And adjusting the pH and EC meters to make sure they are operating correctly.

Electrical Conductivity (EC) a measure of the amount of soluble salts in a solution. The EC meter measures the passage of electrical current through a solution. The more salts that are present in water, the easier it will be for an electric current to pass through the solution.

pH a measure of how acidic or basic a solution is.

Soluble Salts all mineral elements that have dissolved in a solution. This includes the fertilizer nutrients, as well as salts that are impurities in water or fertilizers.

Standard Solution this is a reference solution which contains a specific EC value. This can be used to calibrate the EC meter.

Monitoring Greenhouse pH, EC and Water Source Alkalinity, continued from p. 4

Problems with Low EC

A low EC means that your plants are not getting enough fertilizer salts. Symptoms can include stunted plant growth or leaf discoloration due to lack of nutrients. Nitrogen deficiency often appears first.

Problems with High EC

Excess salts can accumulate when: you are applying more fertilizer than the plant requires; leaching during irrigation is insufficient; or your water source contains naturally high levels of bicarbonates, calcium, chloride, magnesium, sodium, or sulfates. Excess salts can cause tissue death. Symptoms often appear first on the lower leaves and appear as yellowing (chlorosis) or browning (necrosis) that begins at the edges of the leaves and spreads inward. High salts can cause root tips to die back; and plants may show wilting even though the medium is still moist. High salt levels have been shown to increase the incidence of *Pythium* root rot.

pH Guidelines

Excessively high and excessively low pH should be avoided. For many plants a pH of 5.5-6.5 typically allows the various mineral nutrients to be absorbed at adequate levels; and not at levels too high that toxicity can result.

Testing Alkalinity

It is recommended that growers test their water alkalinity once or twice a year. Testing can be done by a qualified nutrient diagnostic laboratory; or home kits are available which will give you the approximate range. If your alkalinity is greater than about 100 ppm you can expect that pH of the container medium will tend to increase over time unless preventative measures are taken such as injecting acid to neutralize the alkalinity or using a more acidic fertilizer. Once you know your water's alkalinity an Extension Educator or a representative from the diagnostic lab can help you design a fertilizer program or acid injection program to control for pH drift. -*TR*

Table: EC interpretation values (mS/cm) for various extraction methods[1].

Source: Monitoring and Managing pH and EC Using the Pour Thru Extraction Method. North Carolina State University. Online: http://www.pourthruinfo.com/

1 : 5	1 : 2	SME	PourThru[2]	Indication
0 to 0.11	0 to 0.25	0 to 0.75	0 to 1.0	**Very Low.** Nutrient levels may not be sufficient to sustain rapid growth.
0.12 to 0.35	0.26 to 0.75	0.76 to 2.0	1.0 to 2.6	**Low.** Suitable for seedlings, bedding plants and salt sensitive plants.
0.36 to 0.65	0.76 to 1.25	2.0 to 3.5	2.6 to 4.6	**Normal.** Standard root zone range for most established plants. Upper range for salt sensitive plants.
0.66 to 0.89	1.26 to 1.75	3.5 to 5.0	4.6 to 6.5	**High.** Reduced vigor and growth may result, particularly during hot weather.
0.9 to 1.10	1.76 to 2.25	5.0 to 6.0	6.6 to 7.8	**Very High.** May result in salt injury due to reduced water uptake. Reduced growth rates likely. Symptoms include marginal leaf burn and wilting.
>1.1	>2.25	>6.0	>7.8	**Extreme.** Most crops will suffer salt injury at these levels. Immediate leaching required.

[1]Adapted from: On-site testing of growing media and irrigation water. 1996. British Columbia Ministry of Agriculture.
[2]Due to the variability of the PourThru technique results, growers should always compare their results to the SME method to establish acceptable ranges.

Free Workshops on Managing Fertility, Water Quality, Irrigation and Media in your Greenhouse and/or High Tunnel

May 6 and 7, 2014 - 2 Locations

Dr. Neil Mattson of Cornell University specializes in growing crops in protected culture. Please join us to learn more about managing food crops in these systems. **Farms are encouraged to bring water samples for testing pH, EC and alkalinity or soil and substrate samples for pH and EC testing.**

- Tuesday, May 6, 4-6 pm at Fledging Crow Farm, 122 A. Robare Road, Keeseville, NY 12994
- Wednesday, May 7, 3-5 pm at Ariel's Farm, 194 Northern Pines Road, Gansevoort, NY 12831

The workshop is free, but registration is encouraged.
Call Marcie at 518-272-4210 or mmp74@cornell.edu.

Professor Neil Mattson tests irrigation water alkalinity at seedling production site.

Welcome to the 2014 Weather Table—This chart is compiled using the data collected by Northeast Weather Association (NEWA) weather stations and is intended to give you a "snapshot" of what is currently happening in 2014 compared to 2013. We have tabulated the number of Growing Degree Days (GDDs) using a Base 50^{o} Fahrenheit and a start date March 1, for both 2013 and 2014. Rainfall amounts are also tabulated starting March 1 of each year. Locations may change throughout the season if we feel the data is not truly reflective of the area. If there are other locations that you would like included, please let us know. For more information about NEWA and a list of sites, please visit http://newa.cornell.edu/. This site has information not only on weather, but insect and disease forecasting tools that are free to use.

2014 Weekly and Seasonal Weather Information

	Growing Degree Information Base 50^{O} F			Rainfall Accumulations		
Site	**2014 Weekly Total** 4/21/4/27	**2014 Season Total** 3/1 - 4/27	**2013 Total** 3/1—4/27	**2014 Weekly Rainfall** 4/21—4/27 (inches)	**2014 Season Rainfall** 3/1—4/27 (inches)	**2013 Total Rainfall** 3/1—4/27 (inches)
Albany	**16.5**	**58.2**	**26.0**	**0.77**	**4.51**	**4.95**
Castleton	**13.3**	**55.6**	**32.6**	**0.72**	**4.65**	**0.90**[1]
Clifton Park	**14.2**	**45.1**	**14.6**	**0.76**	**4.88**	**5.67**
Clintondale	**19.0**	**68.4**	**57.6**	**0.74**	**6.14**	**4.36**
Glens Falls	**26.1**	**50.7**	**15.5**	**0.37**	**5.03**	**5.76**
Guilderland	**5.0**	**40.5**	**17.5**	**0.04**	**0.45**	**0.54**[1]
Highland	**17.0**	**66.4**	**61.8**	**0.86**	**6.21**	**2.15**
Hudson	**17.1**	**63.5**	**38.1**	**0.34**	**4.56**	**3.79**
Marlboro	**10.1**	**52.9**	**54.4**	**0.81**	**5.74**	**3.18**
Montgomery	**11.5**	**54.0**	**52.5**	**0.77**	**5.46**	**4.05**
Monticello	**5.4**	**33.4**	**33.0**	**0.16**	**3.47**	**0.07**[1]
North Easton	**14.2**	**45.1**	**30.0**	**N/A**[2]	**N/A**[2]	**1.29**
Peru	**16.0**	**34.3**	**16.4**	**0.38**	**3.68**	**1.39**
Shoreham, VT	**14.1**	**38.0**	**17.0**	**0.41**	**4.24**	**4.40**
Wilsboro	**15.0**	**31.2**	**19.7**	**0.36**	**2.75**	**2.15**

[1] These units were not properly working in 2013. We are working on how to correct these values to reflect better rainfall amounts for 2013.

[2] We are contacting the host site to determine if these units are working properly.