Cornell University Cooperative Extension

Eastern NY Commercial Horticulture Program

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Weekly Vegetable Update

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Regional Updates:

North Country—Clinton, Essex, northern Warren and Washington counties

Temperatures have remained on the cool side, with several rain showers and partly cloudy skies. This is good weather for leaf growth but warm season crops are still waiting for more sun and heat. Grassy weeds are thriving; dandelions are either still in bloom or just going to seed now, depending on the location and micro-climate there. The northern region has missed the torrential rains but the regular showers are keeping all but the best drained soils rather wet, delaying some field work.

Capital District—Albany, Fulton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, southern Warren and Washington counties

Field work has been accelerated in the last week despite some varying rain events and crops on plastic mulches are steadily getting planted. Some severe weather occurred in the western part of our territory with a tornado reported and some hail activity. Flea beetles are being seen on early crucifers so please scout carefully. And even though it seems to have been rainy the last couple of days, crops planted in plastic mulches may still be dry so make sure you check under that plastic and be sure your drip system is ready to go.

Mid-Hudson Valley—Columbia, Dutchess, Greene, Orange and Ulster counties

Bright sunshine and more seasonal temperatures are helping plants put on some size these past few days. Watch aphid populations on young squashes as they can transmit viruses that can significantly decrease marketable product later on. Diamondback moth caterpillars have been found in low numbers in our area and imported cabbage worm butterflies have been seen fluttering over brassica crops socializing and laying eggs so check for them soon. If you plan on using Bt products such as Xentari and Javelin you will have best results targeting smaller larvae. More on caterpillar pests in brassicas in next week's issue.

This early planting of Romaine lettuce on plastic is off to a good start, and so are the galinsoga weed seedlings in the aisles. A light cultivation at this time would really pay off. *Photo by ADI*

Serving the educational and research needs of the commercial small fruit, vegetable and tree fruit industries in Albany, Clinton, Columbia, Dutchess, Essex, Fulton, Greene, Montgomery, Orange, Rensselaer, Saratoga, Schoharie, Schenectady, Ulster, Warren and Washington Counties

Responding to Hailstorms

No one wants to have to worry about hail damage, but the simple truth is we have to worry about it as it has become an annual event for many growers throughout the area. Late last week we had several reported hail storms move through the area as well as a suspected tornado. I hate to be the one to say it, but I suspect this is just the beginning and a preview of what the rest of the season may bring! Below is an article that Crystal Stewart put together after a hail event last year that is still very pertinent, so take some time to look it over regardless if you have had hail damage on your farm or not as it could be important later in the season to remember some of the key points.

Preparing for hail: There are some normal maintenance activities that will also benefit your plants in the event of a hailstorm. The use of rowcovers *may* help to diffuse the impact of hailstones and reduce injury to plants, especially when using rowcover and hoops. Deciding how long to leave those covers on, or whether to put them on your later plantings, is a factor to consider. However, we have also seen rowcovers completely removed by the high winds that can precede hail, so this is certainly not a fail-safe.

The second precaution which will help in the event of hail is the application of a preventative fungicide such as copper or chlorothalonil. Although these products are not rain-fast, we have found that they still help reduce incidence of fungal and bacterial infections from hailstorms.

After hail: The damage left by hail varies tremendously based on the size and shape of the hailstone, the wind velocity of the storm, and the duration of the hail event. Deciding how to respond is really case-by-case. Two farms right next to each other can experience very different levels of damage. However, there are some rules of thumb that generally hold true.

⇒ **Cucurbits are going to look really bad but are likely to recover.** Those huge leaves tend to tatter very dramatically during hail, and can look absolutely awful. However, the leaves can also help to protect the growing points, which largely determine whether a plant will recover or not. Generally cucurbits that are old enough to have an established root system and have intact growing points will be able to generate new leaves very quickly and will begin producing fruit within a couple of weeks. To facilitate this process, give some extra fertility (especially nitrogen or a good soluble complete blend like a Peter's 20-20-20) through the drip system. Pick and remove summer squash fruit that were damaged by hail if you can as this will remove some added stress from the plant.

⇒ **All plants will benefit from a protective fungicide application.** After hail, plants have hundreds of small (or large) wounds which leave them extremely vulnerable to diseases. As soon as you can get on the field, apply a protectant such as copper or chlorothalonil (copper will protect from bacterial and fungal diseases so it may be the better option), even if you applied one before the storm. This will help prevent infection while the plant heals up those wounds. [Information from New Jersey indicates that an application of a disinfectant such as Oxidate or other labeled formulation for plants be used to help reduce the bacterial and fungal infections. Oxidate must be applied by itself and should be used in between a standard protectant fungicide rotation which should include a copper in each application to reduce bacterial disease pressure. (*Source: Andy Wyenandt, May 24, 2014 Plant and Pest Advisory, Rutgers Cooperative Extension*).]

⇒ **Incidence of bacterial rot in onions is going to increase.** We tend to see many more issues with onion storage following hail. Copper may help somewhat, but results have been mixed to poor.

Deciding what to do with tomatoes can be tricky. According to Dr. Reiners, determinate varieties suffering from moderate to severe damage (think of snapped branches and stripped leaves) are most likely to be lost causes because by the time they recover they will practically be at the end of their lives. It is best to pull plants at this threshold out. Indeterminate tomatoes have a better chance of recovering from hail. All fruit which was hit will be relegated to seconds at the very best. Damage can vary greatly by variety because of the differences in canopy cover, so assess each separately. Last year we saw Primo Reds that were a complete loss next to Amish Paste tomatoes which were about 80% ok.

On plants with heavy foliage such as corn and sweet potatoes, a foliar feeding including nitrogen and some micronutrients may be beneficial. Remember that you have to have intact foliage to spray for this to be effective.

Once you have done everything you can to clean up and protect your plants, it is often best from a mental health standpoint to walk away for a few days up to a week. There is a small period of time where there is nothing more to do but let the plants recover. As always, if you would like help deciding what to do after hail or any other weather event, please give us a call.
–CDB and CLS

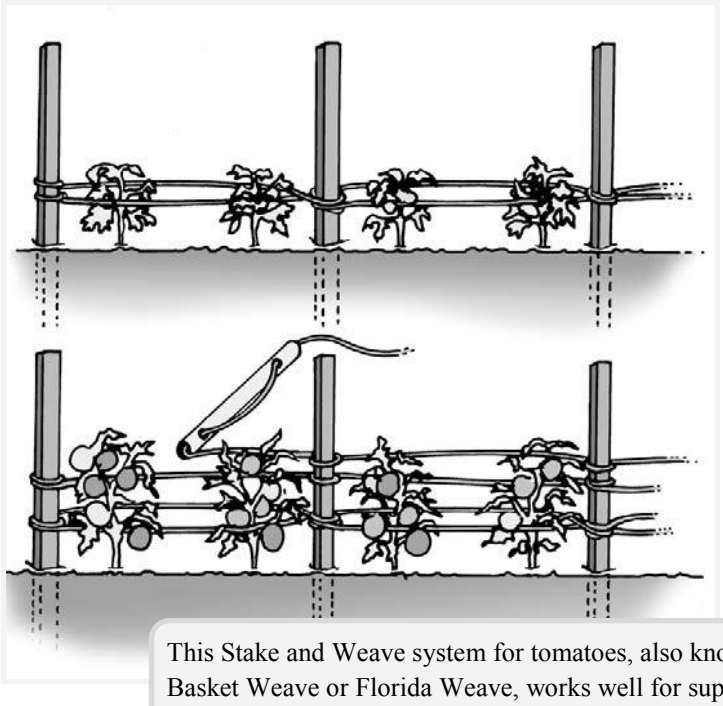
Support Your Peppers

Bigger is better, at least in the eyes of most customers, so the pressure is on to grow the biggest bell peppers you can. But pepper plants are notorious for being brittle, especially once they become loaded with those large fruits. Growers say they barely brush their plants and whole branches snap off. This is especially true for peppers grown in tunnels where they flourish under the protection from wind and rain.

While any pepper would benefit from some support, the large fruited varieties that must have it include: Revolution, Olympus, and indeterminate varieties such as Chesapeake that keep growing taller all season long.

The easiest way to support peppers is to use the Stake and Weave system developed for determinate tomatoes. More stakes are better so one stake for every two plants is ideal, although you could probably get away with one stake for every 4 plants except for the really large types. Set up the system early before the plants need it so you can get some basic support established. Then as the plants grow, add another tier of twine, looping it around each stake and running it along either side of the plants, up one side of the row and back down the other side. Use 4-5' tall stakes to give you 3-4' in height once set in the ground. Chesapeake, the indeterminate type, will need at least 5 feet of support and some growers train this variety up twine using clips the same way they manage indeterminate tomatoes. *-ADI*

Below: Indeterminate Chesapeake Pepper, trained to a single leader the way tomatoes are often managed. *Photo by ADI*



This Stake and Weave system for tomatoes, also known as Basket Weave or Florida Weave, works well for supporting bell pepper plants, too. *Photo credit: Lewis Jett, Univ W. Va*

These huge bell peppers are heavy and plants need support to keep from breaking. *Photo by ADI*

Have questions? Need something in the field or greenhouse checked out?

The Eastern NY Horticulture team has a number of expert educators throughout the region in the areas of vegetable, tree fruit, and small fruit production; business development and food safety/GAPS. Give one of us a call and we will get you in touch with someone who can help.

Water Testing

Even if you are not GAPs certified, or even investigating the possibility of becoming such….get your wash water tested. Produce should only be washed in potable water. If your wash water is found not to be potable, it would be best to add a chlorination system. If that is not possible, it would be best to leave the produce unwashed than washed in water that is not potable. Water tests should be done annually on each of the wells on the farm
Good/quick factsheet on wash water requirements: http://www.uvm.edu/vtvegandberry/factsheets/postharvest.html

Angular Leaf Spot and Early Squash

Although it has been relatively dry, we have had some daily light rain showers that have kept leaves wet for a longer then normal period which means more opportunity for some diseases to get started. The one that comes to mind first is Angular leaf spot. Angular leaf spot (ALS) is caused by a bacterium *Pseudomonas syringae*, which attacks cucumber and zucchini squash primarily but also is a problem for melons, some winter squash, pumpkins and gourds. Summer squash right next to the zucchini appeared unaffected so far. This is something of a regular occurrence the last couple years with ALS showing up very early in zucchini plantings.

The photo below is of zucchini squash grown under row cover. Initially leaf symptoms appear as small, irregularly shaped, water-soaked lesions. The spots expand until they are limited by larger veins, giving them the angular appearance which the disease is named for. Under our current humid conditions, the water-soaked spots can be covered by a bacterial ooze, which can dry and give the leaf area near the spot a crusty appearance. This can also happen on the underside of the leaf. As the spots dry, they shrink and tear away from the healthy tissue leaving large, irregular holes and giving the leaf a ragged appearance. Squash and watermelon leaf lesions are more variable in size than cucumber lesions which are usually smaller. The squash and melon lesions can be surrounded by a yellow halo. Lesions can appear on the fruit as well, but will be more circular and are smaller than on the leaf. If left untreated, the ALS lesions will crack open, allowing secondary fungi and bacteria to invade possibly resulting in a slimy, foul-smelling fruit rot.

The *Pseudomonas* bacterium is a seedborne pathogen, but it can also overwinter in infested crop residues. The disease is widespread and is especially damaging when there are extended and frequent summer rains when daily temperatures range between 75 and 82° F. Two weeks of dry weather will really help in arresting the disease.

To manage angular leaf spot, strive to plant certified, pathogen-free seed. There are resistant cucumber varieties, but no squash or melons are resistant. A cucurbit rotation should avoid replanting in the same field for at least 2 years as the bacteria can survive for that same duration. Do not over fertilize and avoid overhead irrigation as well as handling plants while they are wet. This includes cultivation, harvesting etc. Harvest clean plantings first and any infected plantings last as this will help slow the pathogen down. Also, the hot, dry weather predicted to start this weekend will also help dry the pathogen up. Plow under or burn crop debris immediately after harvest. Apply a recommended bactericide at first sign of disease. Tank-mix copper with fungicide like mancozeb that can protect from secondary infection. Copper fungicides will help slow disease spread during particularly wet periods but can be dropped if dry weather continues for 2 weeks. *–CDB*

Images of zucchini with ALS: From left to right, you can see early symptoms on lower, older leaves, then more advanced symptoms, and finally complete leaf death. *Images by CDB*

What's the FRAC?

In many of our articles you will find us referring to FRAC groups when we talk about fungicide resistance management. Understanding FRAC codes is important when choosing products in a rotation. The following is adapted from an article written by Andy Wyenandt, Assistant Extension Specialist in Vegetable Pathology, Rutgers University and the Cornell 2014 Vegetable Production Guidelines. *-TR*

FRAC, or the Fungicide Resistance Action Committee, was developed to help provide resistance management guidelines for fungicide use. Fungicides have been arranged by Group Names or *Chemical Groups* and assigned a **Group Code Number or Letter**. "At-risk" fungicides have a high probability of resistance development because of their modes-of-action (MOA). Those fungicides with chemistries that have a specific target site against fungal pathogens, unfortunately, will have a higher risk for losing efficacy because of resistance development in the pathogen. Importantly, fungicides with similar chemistries and MOAs that belong to the same FRAC code may also be prone to cross-resistance, where a fungus that develops resistance to one fungicide in the FRAC group may also develop resistance to other fungicides in the group, even if those other fungicides haven't been used.

Great lengths have been taken to reduce the risk of fungicide resistance development for many fungi where 'at risk' fungicides are used. There are currently 43 numbered FRAC groupings and 7 lettered groups. As new fungicides with new MOAs are released on the market, new numbered groups will be added to the list. For many vegetable crops many of the most common fungicides used fall into a few of these groupings, most notably those listed in the box below.

Knowing which fungicides belong to which FRAC code will have an impact on spray schedules, disease control, and resistance management. Protectant fungicides, such as those in the FRAC code M, have a low risk for fungicide resistance development and have less stringent restrictions. However, for those chemicals with a higher risk of fungicide resistance development the product labels are more stringent and labels should be followed precisely. Labels often require that high-risk fungicides be tank-mixed with protectant fungicides to reduce the chances for fungicide resistance development. In general, tank mixing high-risk fungicides with protectant fungicides is always a good resistance management strategy. For example and, in general, the strobilurin fungicides in FRAC code 11 should not be sprayed consecutively. Such that, if quadris (azoxystrobin, 11) is sprayed one week, it should not be followed the next week with another group 11 compound such as flint (trifloxystrobin, 11) or cabrio (pyraclostrobin, 11) or a compound containing a group 11 fungicide (pristine, pyraclostrobin + boscalid, 11 + 7). A simple way to remember what to use next in your fungicide rotation is to use a labeled fungicide with a different FRAC number or letter.

Also, do not use "at risk" fungicides as a rescue treatment for disease control. Applying "at risk" fungicide after disease is present will increase the chances for development of resistant populations of plant pathogenic fungi.

FRAC codes for specific fungicides registered by crop can be found in Table 2.3.1 in the 2014 Cornell Commercial

continued on next page

Resistance problems generally not recognized for these groups

Group 33 phosphonates- such as Aliette and Phostrol
Group 40 *carboxcylic acid amides*- Forum and Revus
Group 43 *pyridinylmethly-benzamides*- Presidio

Multi-Sites (M)
Group M1 *inorganics*- coppers such as Kocide, Champion
Group M2 *inorganics*- sulfurs such as Microthiol or Disperss
Group M3 *dithiocarbamates* - Maneb or Mancozeb
Group M5 *chlorothalonil* - such as Bravo

Host Plant Defense Induction (P)
Group P1 *benzo-thiadiazole*- such as Actigard

Biologicals (B)
Group B Fungal and Bacterial species- such as Contans or Serenade

Not Classified: Mineral oils, organic oils, potassium bicarbonate

Some "At Risk" FRAC Groups

Group 1	*benzimadazoles /thiophanates* such as Mertect
Group 3	DeMethylation Inhibitors (DMIs) such as Procure, Rally, Quilt, Tilt
Group 4	phenylamides- such as Ridomil
Group 11	Quinone outside Inhibitors (QoI)- such as Quardris, Flint, Cabrio

What's the FRAC? continued from previous page

Vegetable Production Guidelines. The Guidelines are a great resource to help you chose fungicides for use in rotations. Also, FRAC codes typically appear in a text box on the upper right corner of the first page of fungicide labels.

Efforts in learning and using new chemistries with new modes of action along with knowing their FRAC grouping will ultimately pay off in the long run by reducing the chances for fungicide resistance development.

The Produce Marketing Association Launches New Website!

The Produce Marketing Association (PMA) unveiled its redesigned website, www.pma.com on Tuesday, May 27. With a fresh new design, completely new structure, a fully functioning search feature and mobile-ready access, the website is part of the association's ongoing efforts to bring a complete portfolio of value to members of the fresh produce and floral industries.

Features include:
- Improved search functionality
- Connections to related content
- Mobile design
- Spanish translation

2014 Weather Table—This chart is compiled using the data collected by Northeast Weather Association (NEWA) weather stations. 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** 5/19-5/25	**2014 Season Total** 3/1 - 5/25	**2013 Total** 3/1 - 5/25	**2014 Weekly Rainfall** 5/19-5/25 (inches)	**2014 Season Rainfall** 3/1 - 5/25 (inches)	**2013 Total Rainfall** 3/1 - 5/25 (inches)
Albany	**69.9**	**288.7**	**299.5**	**0.31**	**7.39**	**10.36**
Castleton	**64.1**	**278.2**	**300.9**	**0.46**	**8.28**	**5.97**
Clifton Park	**64.0**	**255.8**	**279.4**	**0.67**	**8.40**	**12.46**
Clintondale	**79.2**	**330.0**	**326.3**	**0.31**	**10.02**	**6.27**
Glens Falls	**68.0**	**298.0**	**254.5**	**0.52**	**8.15**	**9.14**
Guilderland	**74.5**	**269.0**	**254.0**	**0.28**	**1.28**	**1.60**
Highland	**74.9**	**332.0**	**339.2**	**0.36**	**10.13**	**4.88**
Hudson	**70.9**	**314.9**	**283.8**	**0.24**	**8.44**	**5.99**
Marlboro	**72.4**	**287.0**	**303.6**	**1.32**	**11.40**	**6.57**
Montgomery	**80.7**	**305.5**	**287.0**	**1.01**	**11.94**	**7.81**
Monticello	**55.8**	**190.4**	**213.0**	**0.04**	**5.47**	**0.12**
Peru	**65.2**	**236.9**	**270.9**	**1.06**	**7.71**	**2.88**
Shoreham, VT	**64.1**	**243.3**	**295.7**	**0.89**	**7.14**	**7.91**
Willsboro	**55.6**	**217.7**	**260.7**	**0.24**	**4.11**	**6.66**