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Weekly Vegetable Update

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

We've had a mixed bag of weather this week with some cool, rainy days, one day of sunshine, then a stalled weather pattern of warm, steamy weather in the 80's. Every day has a chance of thunderstorms this week with a slight chance of hail. Washed out fields continue to be reported but crops that have been able to take hold are putting on some growth now. Colorado potato beetle eggs are just beginning to hatch, onion thrips are on the increase and cucumber beetles can be easily found deep inside the yellow cucurbit flowers. Oddly, several brassica fields have reported no white cabbage butterflies flitting around yet and those crops are putting on good growth. Weeds are flourishing and wet fields are challenging to cultivate. We need some sunny, warm, dry weather to help crops catch up!

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

Warmer weather was welcomed and pushed plants along nicely, but it also brought thunderstorms with hail to the region as well as additional heavy downpours. Fertility continues to be a concern for many growers, as many nutrients have washed through the root zone.

Scapes are off at about 90% of farms who plan to remove them, and bulbs are sizing nicely. If the weather pattern holds we might be looking at wet weather at harvest time, which complicates things. Try to have a warm, dry space available for curing. High tunnels are great. More on this next week.

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

Crops are doing well and appear to be recovering from the stress of all of that rain. As weather turns hot and humid the threat of damaging thunder storms looms. Consider being prepared with a copper spray either before or immediately after a strong storm. This is not 100% effecting in managing bacterial diseases but may reduce infection after damage. The best cure is cooler, dry air following the damage but that is not always available.

Longest day has occurred and bulbing on onions has/will begin. Significantly decrease or cease nitrogen applications on onions to reduce risk of bulb decay later. Also, now, be especially cautious with weeding, herbicides or other activities that could harm the leaves and open a wound where bacteria can enter.

We had our first field-grown summer quash this week and it looks like we may have a few acres of sweet corn ready for the fourth!

Responding to Hailstorms

We have had numerous hailstorms in our region over the last few weeks, and the forecast continues to call for unsettled weather. While no one wants to think about the possibility of hail hitting their beautiful crops just as they start to respond to the heat and take off, the likelihood that we'll see more hail seems pretty high. So let's talk about it.

Preparing for hail: There are some normal maintenance activities that will 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. When deciding how long to leave those covers on, or whether to put them on your later plantings, this 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 maintenance activity which will help in the event of hail is the application of a preventative copper or chlorothalonil spray. 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.

1. 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 nitrogen through the drip system. Pick and remove summer squash fruit that were damaged by hail if you can.

2. All plants will benefit from a protective fungicide/bactericide 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



Image 1: Determinate plants were snapped off about halfway by high winds and stripped by hail. These plants are not salvageable.

fungal diseases so is the better option), even if you applied one before the storm. This will help prevent infection while the plant heals up those wounds.

3. 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-Image 1) 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, eventually.

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.

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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 this is nothing more to do but let the plants recover. Nice time for a mini vacation. Really.

As always, if you would like help deciding what to do after hail or any other weather event, please give us a call. -CLS



Image 2: Exposed fruit have been severely damaged by hail. These fruit would not be marketable.

How Copper Sprays Work and Avoiding Phytotoxicity

Now that we've started seeing disease in veg crops, bacteria in particular, growers are considering copper sprays for management. Copper has been widely used in both conventional and organic production for some time. Copper was one of the first elements used as a plant fungicide (the other was Sulfur). Its discovery can be traced back to the famous origin of Bordeaux mixture, containing a mixture of copper sulfate (CuSO_4) and slaked lime, and used for downy mildew control in French vineyards.

Recently, growers have asked me questions regarding the mode of action of copper and had concerns about phytotoxicity. First, let's begin with how copper controls pathogens. Copper is usually applied in the "fixed form" which lowers its solubility in water. Fixed coppers include basic copper sulfate (e.g., Cuprofix Ultra Disperss), copper oxide (e.g., Nordox), copper hydroxide (e.g., Kocide, Champ), copper oxychloride sulfate (e.g., COCS), and copper ions linked to fatty acids or other organic molecules (e.g., TennCop, Cueva). The spray solution is actually a suspension of copper particles, and those particles persist on plant surfaces after the spray dries. Copper ions are gradually released from these copper deposits each time the plant surface becomes wet. The gradual release of copper ions from the copper deposits provides residual protection against plant pathogens. At the same time, the slow release of copper ions from these relatively insoluble copper deposits reduces risks of phytotoxicity to plant tissues. Copper ions denature proteins, thereby destroying enzymes that are critical for cell functioning. Copper can kill pathogen cells on plant surfaces, but once a pathogen enters host tissue, it will no longer be susceptible to copper treatments. Thus, copper

sprays act as protectant fungicide/bactericide treatments, but lack post-infection activity.

Because different formulations have different properties when used as spray materials, growers need to learn how to read and interpret labels. The effectiveness of copper sprays is highly correlated with the amount of elemental copper that is applied. The metallic copper content varies widely by product. Potency also varies by how the product is prepared. Finely ground copper products are more active than coarsely ground ones. Professor Tom Zitter of Cornell University suggests that for vegetable crops "Begin by choosing a copper product with at least 20% or more copper as the active ingredient to insure the greatest release of copper ions".

There are several suggestions for avoiding phytotoxicity (or plant injury) with copper sprays. Limit the copper ion concentration on plant surfaces by using copper products that are relatively insoluble in water, i.e. fixed copper. Copper can accumulate to high levels on plant tissue when sprayed repeatedly to cover new growth and there is no rain. In this situation, after a rain event, a large amount of copper ions may be released leading to phytotoxicity. Solubility of fixed coppers increases under acidic conditions. Copper sprays will become more phytotoxic if they are applied in an acidic solution. Most copper products are formulated to be almost insoluble in water at pH 7.0. As the pH of water decreases the solubility of the copper fungicides increases and more copper ions are released. If the water used is too acidic (below pH 6.0-7.0 — depending on the copper formulation) excessive amounts of copper ions could be produced which may cause damage to fruit and foliage. Formulations vary in solubility — hydroxides are more soluble than

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oxychlorides which are more soluble than tribasic copper sulphates and cuprous . Less soluble formulations are usually more persistent. Check the pH of your water source. Copper sprays generally cause more phytotoxicity when applied under slow drying conditions, such as when it's wet and cool. Always read the label instructions follow the Copper and tank mix partner labels.

For a comprehensive list of Copper Products Used for Vegetable Disease Control see:

<http://vegetablemdonline.ppath.cornell.edu/NewsArticles/CopperFungicides2012.pdf> - TR

Sources: T. A. Zitter, Cornell University Department of Plant Pathology & Plant-Microbiology and David A. Rosenberger, Professor of Plant Pathology, Cornell University's Hudson Valley Lab

Hudson Valley Sweet Corn Pest Report

By Peter Jentsch, Hudson Valley Lab

We were a bit premature in determining the peak of the first generation ECB adult flight as this week's ECB pheromone trap catch numbers exceeded historical highs. This extended emergence will require prolonged management as newly laid eggs give rise to newly emerging larva. The E-strain remains the highest of the two ECB strains with 59 adults of the 82 ECB captured in New Paltz last week. The second generation of ECB-E strain will begin to emerge at about 1400 modified base 50 degree days.

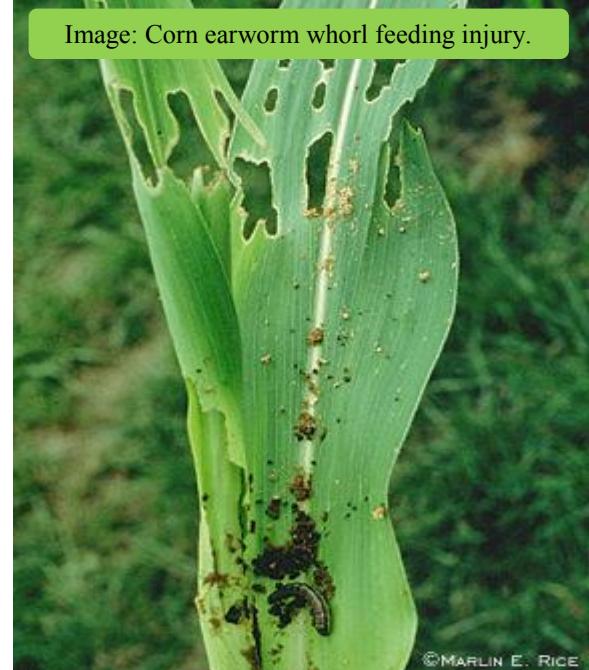
Corn Earworm adults have now arrived in the Mid-Hudson Valley. Four CEW adults were caught in our New Paltz pheromone traps this week. According to the chart below, fields that have a weekly CEW catch of 3.5 – 7 should be on a five-day spray schedule. No western bean cutworm have been observed yet this season. Fields should be scouted for the presence of Corn earworms (CEW), Fall armyworms (FAW) and European corn borers (ECB) larval feeding.

Scouting for ECB feeding should include foliar assessments for a series of straight line pinholes as well as "window pane" damage on the emerging leaves from the whorl. Window pane damage occurs when the young ECB larvae feed on the upper epidermal of the leaf leaving a clear lower level epidermal. ECB feeding damage on newly emerging tassel is usually accompanied by white or light brown frass the size of fine sand.

Average Corn Earworm Pheromone Catch

Per Day	Per 5 Days	Per Week	Days Between Sprays
<0.2	<1.0	<1.4	No Spray (for CEW)
0.2-0.5	1.0-2.5	1.4-3.5	6 days
0.5-1.0	2.5-5.0	3.5-7.0	5 days
1-13	5-65	7-91	4 days
over 13	over 65	over 91	3 days

Image: Corn earworm whorl feeding injury.



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ECB larvae may also be visible. The worm is cream or light pink in color with a reddishbrown or black head and about 26 mm in length. CEW's and FAW's leave ragged feeding holes in the leaves and tassels with larger and darker frass pellets (see photo above right).

Reports from PESTWATCH have not posted high flights of ECB to our south. Only a single mid-PA site with observations of very high ECB trap captures last week with most sites tapering off, including WNY. CEW are just beginning throughout the region with New Paltz, 4 sites in WNY, eastern Long Island and the southern tier of PA showing emergence in low CEW numbers.

WNY Reports have not found FAW or WBC this season. However, CEW was captured for a second week in 4 locations including Batavia, Eden, and Williamson and Avoca. Only Eden had CEW numbers high enough to indicate the need for a six-day spray interval.

Ground Beetles

It's an easy error to make. You notice some plants being chewed. You look around for clues and spot a good sized hole in the soil nearby. If you poke around in the soil you may unearth a surprisingly large, aggressive-looking beetle and it's easy to conclude that you've found your culprit. But you'd be wrong.

Ground beetles have an appetite for grubs, slugs, caterpillars, wireworms and other soil-dwelling pests. They aren't causing the damage; they're helping fight the problem. Ground beetles are usually nocturnal so they can be hard to find without digging through the soil. When exposed to light they scurry to bury themselves back under ground. They especially like the cover provided by crop debris and natural mulches.



A typical ground beetle larva. Photo from www.ipm.iastate.edu



Some ground beetles common in Pennsylvania, $\frac{1}{2}$ - 1" long

<http://ento.psu.edu/extension/factsheets/pdf/ground-tiger-beetles>

Ground beetle larvae are even more intimidating. They tend to be robust with noticeably large jaws, the better for devouring those worms and slugs. Ground beetle adults and larvae are good examples of why it is important to accurately identify the pest before deciding which course of action to follow. -ADI

For more information on many types of ground beetles visit: <http://ento.psu.edu/extension/factsheets/pdf/ground-tiger-beetles>

Spinach Leafminer

By Ray Range, CCE Orange County

The spinach leafminer (*Pegomya hyoscyami*) is a common pest that causes unsightly leaf blisters and necrosis of spinach, beets, chards and host weeds like lambsquarters, nightshade, chickweed and plantain. Marketability of the leaf crops is significantly impacted. This is the case for beet greens and bunched beets.

The adult fly appears in early to mid-May after overwintering in the soil as pupae. It is about 5 mm long and are gray in color. The adults can be seen flying near the ground between the plants. The females deposit eggs singly or in rows of two to five side by side on the underside of the leaves. In as little as three days but more commonly in four to six days the tiny legless, white to yellowish maggots hatch from the eggs and work their way into the leaf tissue.

The maggots feed between the upper and lower leaf surfaces of the host plants mining out the tissue in

between. It is not unusual for several larvae to be in the same leaf. As the maggot grows and continues to feed, the mines, which are at first thread-like, become blotch-like and are easily seen on the infected leaves. The larvae are full-grown in 7 to 16 days when they drop to the ground and burrow a few inches into the soil to pupate. Two to

four weeks later the adult flies emerge and will soon lay eggs for another generation. In New York you can expect three to four generations each year.

Management – a preventive spray schedule beginning when the spinach is two true leaves and repeated every 7 days. Remove wild hosts like lambsquarter, nightshades, chickweed, and plantain. Deep plowing in the spring can reduce the overwintering population by burying existing pupae.

In smaller stands, infected leaves can be picked before the maggots drop to the ground. Removing and destroying these infected leaves can lessen the leafminer pressure.



Meetings and Notices

Cornell Hudson Valley Lab Field Tour and Barbecue Highland, NY July 18, 2013 Mark your calendar and look for more details and pre-registration information in the near future. We hope you will attend!

Save the date: July 17th - Twilight Meeting with Tom Zitter at Charlie Brizzell's farm. This is Tom's final twilight meeting, as he will be retiring this year. Stop by to learn about the latest disease updates and to wish Tom a happy retirement. DEC credits applied for. Look for more details in next week's update.

Don't Forget WPS

Just a quick reminder that any farmers who apply pesticides (conventional or organic) and have workers (non-farm owners) who are not immediate family members (children, siblings or parents) need to perform Worker Protection Standards Training for all of the workers. Workers must be trained before the 5th day of work where they could possibly enter a treated area. -MRU

Rules and regulations can be found at:

<http://www.epa.gov/pesticides/health/worker.htm>

A sample worker training sign-in form can be found at:

<http://www.safepesticideuse.com/pdf/>

[WPS SUGGESTED ATTENDANCE SHEET
\(WORKERS HANDLERS\).pdf](#)

Weekly and Seasonal Weather Information

Site	Growing Degree Information Base 50° F			Rainfall Accumulations		
	2013 Weekly Total 6/19—6/25	2013 Season Total 3/1 - 6/25	2012 Total 3/1—6/25	2013 Weekly Rainfall 6/19—6/25 (inches)	2013 Season Rainfall 3/1—6/25 (inches)	2012 Total Rainfall 3/1—6/25 (inches)
Albany	155.5	785.0	987.5	1.13	17.40	12.70
Castleton	152.3	768.2	997.2	1.18	14.09	12.70
Chazy	121.0	685.6	1005.0	3.12	16.11	9.29
Clifton Park	147.6	725.0	936.3	0.56	17.67	16.32
Clintondale	161.7	870.0	689.0	NA	NA	10.60
Glens Falls	134.8	669.2	817.5	0.15	13.98	11.99
Granville	132.0	NA	777.5	0.05	NA	15.00
Guilderland	141.5	710.0	903.6	0.13	4.13	5.12
Highland	152.3	864.9	1053.0	0.26	11.09	14.05
Lake Placid	89.9	401.9	NA	0.81	16.14	NA
Montgomery	153.0	804.7	930.5	0.00	12.71	NA
Monticello	128.7	612.4	731.0	0.00	0.17	0.70
Redhook	150.0	776.1	960.5	0.94	11.68	11.35

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