Cornell Cooperative Extension | Cornell Vegetable Program

VEGEdge

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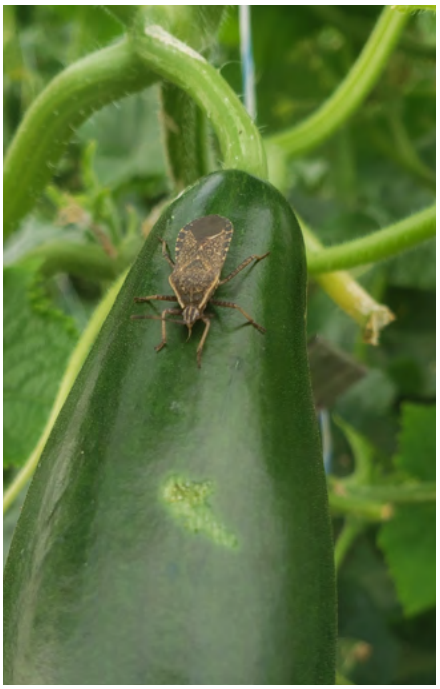
Squash Bugs on High Tunnel Cucumbers

Judson Reid, Cornell Cooperative Extension, Cornell Vegetable Program

Although tomatoes account for the overwhelming majority of high tunnel crops, cucumbers are an excellent option given their vertical growth potential, high yield per plant and earliness to market. However, cucumbers are more pest intensive than tomatoes and this difference is even greater indoors versus out. Common greenhouse pests such as thrips, mites and aphids are common on high tunnel cucumbers, and with large open sides other outdoor pests such as Striped Cucumber Beetle and Squash Bug can also enter and proliferate. Not often considered a greenhouse pest, the Squash Bug can and has ruined high tunnel cucumber crops this year.

Squash Bug adults overwinter in NY on crop debris, so we can expect this pest every spring. Since high tunnels cucumbers are planted much earlier than in the field, it can be expected that emerging adults will move into high tunnels on farms with field grown cucurbits. Copper colored



Adults Squash Bugs cause severe damage to fruit and foliage. *Photo by J. Reid, CCE*

Freshly hatched nymphs do not resemble adults, rather are grey-to-green with long black legs. *Photo by J. Reid, CCE*

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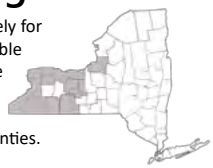

VegEdge newsletter is exclusively for enrollees in the Cornell Vegetable Program, a Cornell Cooperative Extension partnership between Cornell University and CCE Associations in 14 counties.

The newsletter is a service to our enrollees and is intended for educational purposes, strengthening the relationship between our enrollees, the Cornell Vegetable Program team, and Cornell University.

We're interested in your comments. Contact us at:
CCE Cornell Vegetable Program
480 North Main Street, Canandaigua, NY 14224
Email: cce-cvp@cornell.edu
Web address: cvp.cce.cornell.edu

Contributing Writers
Elizabeth Buck
Robert Hadad
Christy Hoepting
Margie Lund
Julie Kikkert
Judson Reid

Publishing Specialist/Distribution/Sponsors
Angela Ochterski

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The next issue of VegEdge newsletter will be produced on July 14, 2021.

Accumulated Growing Degree Days

Julie Kikkert and Emma van der Heide, CCE Cornell Vegetable Program

Accumulated Growing Degree Days (AGDD)
Base 50°F: April 1 - July 5, 2021

Location**	2021	2020	2019
Albion	1069	948	830
Arkport	864	805	771
Bergen	1004	919	799
Brocton	1027	929	832
Buffalo*	1096	942	814
Burt	934	869	718
Ceres	873	784	832
Elba	956	892	769
Fairville	960	894	752
Farmington	1000	927	780
Fulton*	963	918	740
Geneva	1033	955	828
Hammondsport	969	903	791
Hanover	1003	933	824
Lodi	915	975	861
Niagara Falls*	1045	924	768
Penn Yan*	1087	981	875
Rochester*	1041	952	902
Sodus	1062	911	734
South Bristol	987	913	787
Varick	1099	1008	893
Versailles	967	907	824
Williamson	942	869	713

* Airport stations
** For other locations: http://newa.cornell.edu

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eggs are laid in clusters on the underside of cucumber leafs, occasionally on the upper surface too. Freshly hatched nymphs do not resemble adults, rather are grey-to-green with long black legs. Feeding damage from Squash Bug is severe. Plants stunt, yellow and wilt with crisp, brown leaf margins. This pest is a sap feeder, so the multiple puncture wounds can lead to hollow craters on the stem.

Copper colored eggs are laid in clusters on the underside of cucumber leaves. *Photo by J. Reid, CCE*

This pest is a sap feeder, so the multiple puncture wounds can lead to hollow craters on the stem. *Photo by J. Reid, CCE*

MANAGEMENT

Management begins with crop rotation to reduce total Squash Bug population on farm. Destroying and incorporating outdoor crops of cucurbits once harvest is complete is critical. For example, farms with multiple plantings of zucchini, cantaloupe or field cucumbers should plan to plow under each planting after final harvest (also a great time to seed a cover crop). We can next consider exclusion techniques such as insect netting on high tunnel side walls. Cucumbers can tolerate higher temperatures than tomatoes, so reduce airflow is generally not a problem. As we promote only self-fertile cucumber varieties for high tunnels, excluding bees is not a concern. Bonus-insect screens also reduce Striped Cucumber Beetle. Given the large size of flying adult Squash Bugs the netting does not need to be very fine.

After having taken the above steps, if Squash Bugs are still observed in the high tunnel, we may consider spray options. Adults are secretive and hide underneath mulch, so not only are they difficult to target with a spray, they are tough to kill period. Instead of targeting adults, scout eggs masses and time pesticide applications once nymphs have hatched. The smaller stages are much easier to kill. What can we spray in a high tunnel that is legal and effective? For organic control, Cornell Guidelines suggest weekly sprays of Neemix combined with Pyganic. These materials are both acceptable for greenhouse crops, however the pyrethrins in Pyganic may lead to aphid outbreaks. Turning then to conventional materials we also want to avoid promoting aphids with pyrethroids, so we avoid the 3A class of insecticides. Sivanto SL (group 4D) has a 1-day pre-harvest interval. ●

Bacteria in Cukes

Elizabeth Buck, Cornell Cooperative Extension, Cornell Vegetable Program

This is what a foliar bacterial infection looks like in cucumbers (see photo). There are two different bacteria that cause leaf spots in cucurbits. Angular Leaf Spot is caused by *Psuedomonas syringae pv. lachrymans* and Bacterial Leaf Spot is caused by *Xanthomonas cucurbitae*. Angular tends to be more constrained by veins and turn white before falling out and leaving shot hole leaves. Bacterial Leaf Spot tends to begin as more of a small, dark, roundish lesion with a yellow halo. From here on out, I'm going to use *Xanthomonas* when I'm talking about Bacterial Leaf Spot, since I find it confusing to just use "Bacterial" like I am using Angular when both diseases are caused by bacteria.

A progression in foliar symptomology from fairly early (right) to..yeah, that's been active a while (top). *Photo by E. Buck, CCE*

Both diseases attack several types of cucurbits. Both will can go after the fruit, with angular capable of preventing proper maturation of cucumbers and *Xanthomonas* commonly leaving small depressed pock marks on pumpkins and hard squashes which can facilitate secondary post-harvest rots. Since both bacteria species go after fruit, both can be seed borne. They will both also carry over in the field, spread from soil to foliage by splashing.

Functionally, it doesn't make a ton of difference which of the two diseases you have in cucumbers. It isn't the easiest to positively distinguish Angular and *Xanthomonas* in the field, especially as the lesions age and coalesce (join together). And that's fine because the treatment and prevention for both diseases is pretty much identical.

If you have bacterial diseases on your cucurbit foliage, you should:

1. Keep out of the field until foliage is dry, including foliage lower in the canopy
2. Avoid overhead watering to reduce soil splashing
3. Treat with copper + mancozeb or just copper if organic
4. Not move people or equipment through infected fields then go to clean younger plantings
5. Incorporate residue after harvest and rotate away for at least 2 years. ●

When Vegetables Go Viral

Caitlin Tucker, Cornell Cooperative Extension, Cornell Vegetable Program

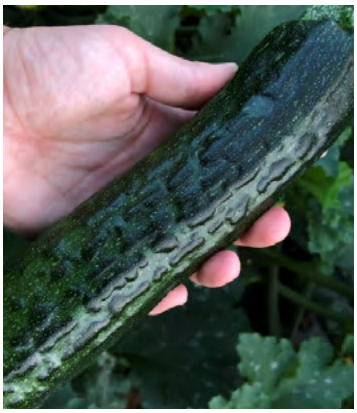
As we settle into the rhythm of the season, I want to draw attention to an issue we may start to see more frequently as pest populations climb and crops mature – plant viruses.

Viruses are frequently transmitted by those insects that have piercing-sucking mouthparts which allow the insect to penetrate into plant cells. Viruses are most frequently transmitted by aphids, leafhoppers, planthoppers, whiteflies, and thrips. Symptoms of plant virus vary depending on the virus, the crop, the variety, and whether you're looking at the foliage or the fruit.

- Leaf distortion (curling, rolling, crinkling, puckering)
- Stunting
- Yellowing
- Mosaic or mottled patterns
- Leaf streaking
- Ringspots
- Malformed fruit
- "Vein clearing" – when veins become unnaturally clear or chlorotic

Chlorotic rings, like in the case of this watermelon which may have watermelon ring spot virus. *Photo by C. Tucker, CCE*

Yellow mottling on the leaves. This pumpkin plant was diagnosed with Zucchini Yellow Mosaic Virus (ZYMV). *Photo by C. Tucker, CCE*



Raised bumps (warts) on zucchini fruit. Virus unknown. *Photos by C. Tucker, CCE*

Vein clearing (when veins become unnaturally clear, yellow, or necrotic) on peas. Virus unknown.

Stunting. This potato plant may have been a victim of a virus. It was stunted compared to the other plants and exhibited overall yellowing. Virus unknown.

Some of these symptoms show up in other situations. **So, how do you distinguish between plant virus and other issues?**

1. **Herbicidal Injury:** Have you recently applied an herbicide? Were conditions less than ideal that day? Any chance of drift?
2. **Abiotic Stress:** Stress from drought, heat, or cold will likely result in multiple crops showing symptoms. It is entirely possible that you drew the short straw this season and multiple crops have plant virus, but that seems improbable. Virus-infected plants will not recover and will continue to show symptoms, whereas if you correct the abiotic stress (fertilize, water, etc.) they should grow out of it.
3. **Nutritional Deficiency:** Virus-infected plants often show up in sporadic hotspots across the field. Nutritional deficiencies are likely going to show up in all plants if they're managed the same way. If you add fertility does the issue correct itself? Do your foliar tests confirm that you have a deficiency?
4. **Seed-borne Viruses:** If all (or most) plants show symptoms of plant virus, particularly from the get-go you might consider whether your seed was contaminated. The only way to confirm is to have the seed tested by a lab.

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At the end of the day it's very hard to reliably diagnose viruses in the field. If you suspect you have a plant virus problem, reach out to our team about the possibility of having the plant diagnosed in the lab.

What can I do about plant viruses? *Dear reader, turn away now if you're not ready.*

There is no cure for plant viruses. I repeat, no cure. Virus-infected plants will not recover. That's not to say your crop will fail. You may simply have reduced yield or quality. In determining your course of action, you should consider how many plants are infected, how close the crop is to maturity, whether the virus may impact fruit or leaf quality, if you plan to succession, and how the virus is transmitted. Some plant viruses can be transmitted through tools, equipment, workers or nematodes – all of which may require different management.

But Caitlin, if insects can spread plant viruses, won't treating the insects reduce the spread of the virus? It's unlikely. By the time you notice symptoms, infectious insects have very likely already spread it to other plants. For example, Aphids need only feed for less than a minute to pick up or spread a virus.

How can I reduce insect-vectored plant viruses in the future? Prevention is key.

- Select resistant varieties
- Purchase seed from reputable companies that test their seed for diseases
- Inspect transplants prior to planting
- Remove symptomatic plants early in the season
- Use reflective mulches to repel insect pests like aphids or thrips
- Manage weeds – many weed species are alternate hosts for pests like aphids or leafhoppers!

Recognize and Mitigate Crop Heat Stress

VEGNET Newsletter, The Ohio State University, 6/12/21; edited by Robert Hadad, CCE Cornell Vegetable Program

[Our weather lately has been intense. After every major heat event we look for rain to mitigate the situation. Even with periodic rain, heat stress can still be problematic and not just here in NY. A couple of weeks ago, the VEGNET Newsletter from Ohio State had a great article: ***Recognize and Mitigate Crop Heat Stress****. Here are the main points from that article. R. Hadad, CVP]*

Climate and weather authorities reported on June 11 that the Upper Midwest, including Ohio, is set to experience hot, droughty conditions. Most agree that a dry year is less problematic than a wet one — provided irrigation is possible. However, it can be difficult for vegetable growers to escape the unwanted effects of excessively high temperatures. A way to separate potentially minor, moderate, and severe heat stress, example effects of moderate-severe heat stress, and main strategies for mitigating heat stress during production are summarized below.

FIVE MAJOR FACTORS INFLUENCING WHETHER HEAT STRESS IS MINOR, MODERATE, OR SEVERE

1. **Crop and variety (sensitivity 1)**. All crops and varieties have a range of temperature in which they perform best. A crop's genetic past (i.e., heritage/Center of Origin) and level of improvement through breeding matter. Individual crops and varieties are thought or proven to be relatively heat tolerant or intolerant.
2. **Timing (sensitivity 2)**. When high temperatures occur in the crop cycle is key. Crop plants can tolerate high temperatures more reliably at some stages than others. Even relatively tolerant varieties can be impacted by temporary spikes in temperature at the "wrong" time.
3. **Intensity**. The extent to which actual temperatures exceed the crop's and variety's optimal range is important … 5 degrees? 15 degrees?
4. **Duration**. The length of time the temperature was consistently above optimal. Short periods of intense stress can be problematic although the effects of prolonged moderate stress typically accumulate.
5. **Mitigation**. Were steps taken to lessen the stress?

Combinations of these five factors represent common scenarios. For example, for vegetables for which pollination is required, excessively high temperatures lasting only hours can disrupt pollination or trigger flower or fruit drop or interruptions in normal developmental patterns. The result can be loss of a "set" (dip in production) and/or malformed or misshapen units to be harvested (e.g., pods, fruits, roots, stems, leaves, tubers). Longer periods of above-optimal temperatures can speed (e.g., bolting) or delay (e.g., prolonged vegetative state) maturity depending on the crop and when they occur in the crop cycle. Heat stress is also implicated as a contributing factor in fruit ripening and physiological disorders (e.g., blossom-end rot). Above-optimal temperatures can also trigger changes in the chemical composition of plant tissues, possibly affecting the color and/or taste of marketable units. Similarly, prevailing temperatures can influence a crop's tolerance to typical inputs and protectants.

Irrigation and shading are among the most common strategies for mitigating the effects of excessively high temperatures in field and high tunnel vegetable production. Irrigation is essential for the obvious reason that evapotranspiration is the crop's primary means of cooling itself. A warm period or season calls for the best irrigation (scheduling) practices, not just pouring water on because, as we know, excessive irrigation (soil moisture) disrupts water uptake, compounding the heat stress problem. Circumstances allow some growers to shade the crop (e.g., in high tunnels) as they attempt to reduce the temperature around it.

CROP Insights

Observations from the Field and Research-Based Recommendations

BEETS

Don't jump the gun on fungicides! Please determine: 1) Your level of crop risk based on market needs, 2) What pathogen you have in the field if any (see last week's article Spot the Difference in Table Beet Leaves), 3) Amount of time before harvest, and 4) The weather at the station nearest your field location. In our scouting this past week, we have seen low levels of bacterial leaf spot (BLS) in most fields but so far have not detected Cercospora leaf spot (CLS). The online CLS forecast is available on the new beta version of the NEWA website at https://dev.newa.cornell.edu/beet-cercospora-leaf-spot. Based on the model, some stations have achieved a moderate to high risk (Albion, Bergen, Conesus Lake (S), Geneva, Medina, Waterport) over the past week (see table) with several stations also predicted to have moderate to high risk on July 8th (Albion, Bergen, Elba, Geneva, Lyndonville, Medina, and Waterport). It takes about 7 to 10 days to detect CLS lesions once an infection occurs. A fungicide application should be considered if there has been a period of moderate to high risk, and the disease reaches an average action threshold of 1 CLS lesion per leaf or 15-20% of incidence or if you have a very high value crop that you need to protect. See the article in the July 1, 2020 issue of VegEdge or the CLS Decision Support Manual available online at https://live-cu-newa.pantheonsite.io/wp-content/uploads/more-info-cercospora-leaf-spot-of-table-beets-20201221.pdf for more detail on scouting and fungicide applications. If you need a hard copy, call Julie Kikkert at 585-313-8160 - JK

Risk of Cercospora leaf spot (CLS) infection on table beet from June 29 to July 8 using a forecasting model. Risk classification is based on cumulative 2-days/risk, and the forecast is based on weather data from Network for Environmental and Weather Applications (NEWA) models. Low risk: <= 3, Moderate: 4 to 6, and High Risk: ≥7.

Location	29-Jun achieved	30-Jun achieved	1-Jul achieved	2-Jul achieved	3-Jul achieved	4-Jul achieved	5-Jul achieved	6-Jul achieved	7-Jul forecast	8-Jul forecast
Albion	1	1	0	**5**	**8**	**5**	2	1	3	**5**
Bergen	0	0	2	**5**	**6**	3	0	1	3	**4**
Conesus Lake (S)	**5**	**8**	**7**	3	2	2	2	**4**	3	3
Elba	0	0	2	3	1	0	0	1	3	**6**
Gainesville	0	0	0	0	0	0	0	0	0	2
Geneva	2	**4**	3	**4**	3	0	0	0	2	**4**
Geneva (Bejo)	0	0	0	0	0	0	0	0	1	3
Lyndonville	1	2	**4**	**5**	2	0	0	1	3	**5**
Medina	1	1	3	**6**	**5**	3	1	1	3	**7**
Waterport	1	2	3	**6**	**6**	3	1	1	3	**7**

Data from dev.newa.cornell.edu accessed 7:00 am on 7/7/2021

ONIONS

The crop is looking great, green all the way to the tips. Recent rainfall and cooler temperatures are perfect for bulbing. Disease pressure remains in check with protectants mancozeb and Bravo holding Botrytis leaf blight (BLB) halos for the most part, although there were a couple of flare-ups of BLB halos in select fields this week. BLB necrotic spots are currently increasing very slowly. Stemphylium leaf blight (SLB) can commonly be found as spore colonization in necrotic leaf tip tissue (= "dirty tips") at this time as the crop is now bulbing. We are starting to see SLB becoming a primary pathogen in few fields. This means that tan or black target spots are showing up on necrotic tissue of outer leaves and leaf tips as well as on green tissue. And that purple and black target spots on necrotic tissue have visible spores – see Figs 1 & 2. It is recommended that SLB fungicide program be initiated at 0.5-1 inch bulb stage and/or mid-July or at first detection of SLB target spots, which is now in some

Figure 1. Examples of Secondary SLB. Left: **"leopard-spotting"** on necrotic tissue, disorganized discoloration with no defined lesions, dried up in appearance. Right: **"dirty tips"**, tan and/or black undefined discoloration of leaf tip. Bottom: Although "showy" this purple SLB target spot appears to be just taking advantage of the necrotic tissue caused by post-emergent herbicide injury in this "pig tail". SLB can "hang out" acting as a secondary pathogen without causing much harm. *Photos: C. Hoepting, CCE*

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fields. With so many "limping" fungicides due to fungicide resistance, developing an effective fungicide spray program has become very challenging. FRAC 3 fungicides are currently the best for SLB, but SLB is unfortunately developing resistance to them too. Building a fungicide program requires strategy – see article on page 8.

Figure 2. Examples of Primary SLB. Middle and Right: Defined tan target spot lesions on necrotic tissue of leaf tip (middle) and outer leaf dieback (right). Spores (concentric rings) are starting to form on target spots. Left: tan target spot forming on green tissue. In this case, it looks like the SLB is killing the green leaf tissue, not the SLB invading already necrotic tissue. Once SLB becomes a primary pathogen, it is time to initiate SLB fungicides, if they have not been applied already. *Photos: C. Hoepting, CCE*

Movento continues to do a great job at controlling onion thrips with many fields getting a 2-week ride with the "momentum of Movento". If you are scouting your onions treated with Movento and see predominantly adult thrips, this means that Movento is in the plant and doing its job. Movento does not kill adult thrips, but it has ovicidal properties and the eggs and newly hatched nymphs produced by these adults do not live. When you start to see plants with new hatches of nymphs more frequently, this is an indication that the Movento is running out of gas. If you are expecting a heavy influx of thrips (that would increase pressure to 5 thrips per leaf or more) from an adjacent cutting of hay or wheat harvest, then you may want to apply a systemic insecticide such as Minecto Pro or Exirel now. Otherwise, you can follow spray thresholds. In the absence of influxes, thrips pressure coming out of Movento was low this week and many growers are using Agri-Mek. - CH

PEAS

Heat stress is showing up in some fields where leaves and tendrils have turned papery white because the plant could not keep up with transpiration and the tissue died. Plants with weakened root systems will be the first to succumb. - JK

POTATOES

Continue to scout fields for Colorado potato beetles. An insecticide application should be considered under these thresholds: 10% defoliation is observed, 200 small larvae, 75 large larvae, or 25 adults/50 plants. Potato leafhopper adults are present in fields and should be monitored. Potatoes will have grown out of protection from insecticides applied to seed or at planting, so continue to monitor for leafhopper adults and nymphs. Treatment is recommended at a threshold of 15 nymphs/50 leaves. - ML

Simcast forecasting indicates that all weather stations have surpassed or will surpass the 30 blight units (BU) needed to trigger a spray for late blight by the end of the week. Wet weather over the past week has made conditions favorable for late blight, so a fungicide application is recommended for all locations. The chart assumes use of a susceptible potato variety Reba, and an application of chlorothalonil on June 30. For locations that are not close to a weather station, forecast information should only be used as a *general indication* of how favorable weather has been for late blight. Forecast BUs are subject to changes as the weather forecast changes, so check forecasting tools regularly to see if disease forecasts have changed. There are no reports of late blight on a national level. - ML

Late Blight Risk Chart, 7/7/21

Location	Blight Units 6/30-7/6[1]	Blight Units 7/7-7/9[2]	Location	Blight Units 6/30-7/6	Blight Units 7/7-7/9
Albion	19	20	Hammondsport	16	20
Arkport	26	20	Knowlesville	19	21
Baldwinsville	34	20	Lyndonville	19	20
Bergen	13	20	Medina	24	21
Buffalo	30	19	Niagara Falls	26	18
Burt	20	21	Penn Yan	32	16
Ceres	46	21	Rochester	31	21
Elba	18	21	Sodus	35	21
Fairville	26	21	Versailles	33	17
Farmington	28	21	Wellsville	48	21
Fulton	41	20	Williamson	23	20
Geneva	25	20			

Calculated using a May 26 crop emergence date, last fungicide application June 30, cultivar Reba

1 Past week Simcast Blight Units (BU)
2 Three-day predicted Simcast Blight Units (BU)

Part II: Onion Fungicide Research Updates and New Recommendations for Control of Botrytis and Stemphylium Leaf Blights, 2021

Christy Hoepting, CCE Cornell Vegetable Program, and Frank Hay, Department of Plant Pathology, Cornell Agri-Tech

HIGHLIGHTS AND RECOMMENDATIONS

- SLB infection (target spots and spores) and leaf dieback occur independently.
- BLB halos and necrotic spots were often not controlled equally by the same fungicide.
- **New strategy for managing BLB and SLB is to select fungicides based on their activity against relevant disease category (BLB halos, BLB necrotic spots, SLB target spots, SLB leaf tip spore colonization, SLB leaf dieback).**
- SLB is developing fungicide resistance to FRAC 3, and we recommend no more than 2 apps per FRAC 3 in 2021.
- Cross-resistance between difenaconazole (FRAC 3 in Quadris Top/Inspire Super) and propiconazole (Tilt) is now known to be occurring. Rotating these two active ingredients will not help to prevent SLB from developing fungicide resistance to FRAC 3.
- Best results for SLB control occurred with FRAC 3 + 3 with Viathon 3 pt/A + Tilt 8 fl oz/A being the best treatment in field trials, followed by Viathon 3 pt/A alone and Quadris Top 14 fl oz/A + Tilt 8 fl oz/A.
- FRAC 7s are broken for SLB control and cannot be saved from SLB developing fungicide resistance to them, despite growers' valiant efforts to use them judiciously. Although Luna products have some utility for control of SLB target spots and leaf tip colonization (e.g. preventing disease infection and development).
- Cross resistance among FRAC 7 subclasses 1 (fluopyram in Luna products), 2 (fluxapyroxad in Merivon) and 3 (boscalid in Endura/Pristine) exists.
- Co-application of multiple FRAC groups against SLB when using FRAC 7 may stave off SLB/BLB fungicide resistance. E.g. Luna Tranquility (FRAC 7 + 9).
- Luna Tranquility 16 fl oz + Rovral 1 pt (FRAC 7 + 9 + 2) kept foliage as green as Quadris Top + Tilt.
- Inspire Super failed to control BLB halos, but was the best treatment in the field trial for control of BLB necrotic spots. Therefore, it does not make sense to use Inspire Super early in the season while BLB halos are dominant.
- Miravis Prime was the best for control of BLB halos.
- FRAC 22 and 19 have potential as rotation partners in a program to relieve pressure of fungicide resistance on FRAC 3.
- SLB fungicides should be initiated at 0.5-1 inch bulb/mid-July especially when SLB target spots have been detected.
- Maximum yield is reached if your crop has about 60% or more green foliage when it reaches >90% lodging. Therefore, we recommend saving fungicides with best activity on SLB leaf dieback (e.g. FRAC 3) for last 2-3 sprays.
- Avoiding heavy thrips pressure may alleviate SLB.
- Extra diligence in preventing DM may help to avoid a potentially uncontrollable DM-SLB complex.

The 2021 Onion Leaf Disease Fungicide Cheat Sheet is available: https://rvpadmin.cce.cornell.edu/uploads/doc_982.pdf

INITIATE FUNGICIDES TO PROTECT AGAINST SLB INFECTION AT 0.5 TO 1 INCH BULBS

Previous epidemiological studies (Hay *et. al.* 2017, 2018) where onion leaves were randomly collected in a grid in an onion field and examined for SLB spores showed that SLB spores were present in onion fields at the end of June, but did not increase substantially until the second half of July. Highest SLB pressure occurs throughout the month of August. According to a laboratory study conducted by Dr. Lorbeer in late 1980s, SLB is 3.5-times more likely to infect older onion leaves than younger leaves. Thus, our recommendation was to initiate SLB fungicide program is at ~ 0.5 – 1 inch bulb stage or mid-July.

In the 2020 Oswego fungicide trial, there was a treatment where SLB fungicides (FRAC 3, 7) were not initiated until July 31 after six weeks of protectant sprays (mancozeb and Bravo) when onions had 1.5 inch bulbs and leaf tips were still green. On Aug 20, which was 6 days after the second FRAC 3 and seventh FRAC 3 + 3 spray in this "delayed" SLB program and Quadris Top + Tilt weekly treatment, respectively, the delayed program had 4-times as many SLB target spots as Quadris Top + Tilt, which had the fewest in the trial. On July 31, incidence of SLB in the delayed program, which had been treated with Bravo 3 pt for the previous two weeks was not significantly different than the untreated. On September 8 (19 days since the ninth spray), the delayed spray program, which now had been treated with four SLB sprays including Inspire Super (FRAC 3 + 9), Quadris Top + Tilt (FRAC 3/11 + 3), Luna Tranquility (FRAC 7(1)/9) and Luna Experience (FRAC 7(1)/3), had significantly less green foliage (32%) than the weekly Quadris Top + Tilt treatment (58%), but was not significantly different than Luna Tranquility weekly (31%). **Again, our results showed that SLB fungicides initiated prior to the end of July/1.5 inch bulbing resulted in healthier foliage at harvest. We recommend use of fungicides with activity on SLB infection (target spots and leaf tip spore colonization) be initiated at 0.5 to 1 inch bulbing and/or in mid-July and/or at first detection of SLB target spots.**

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PREVENTING SLB LEAF DIEBACK TO PREVENT YIELD LOSS

In the Elba trial the best treatment **Viathon + Tilt had 55% green foliage** on September 3rd 6 days after the sixth spray, **and only 5% plants that died standing up on** September 24th 24 days after the sixth spray. Comparatively, the **untreated had 5% green foliage and 30% plants that died standing up**. But, there were **no differences in yield!** In 2017 trial in Elba, treatments that had 48 to 79% green foliage after the crop had lodged on September 6th yielded higher than the untreated (6% green foliage). **These results suggest that maximum yield is reached if your crop has about 60% or more green foliage when it reaches >90% lodging.** Further, these results suggest that % green foliage from 50% lodging (usually timing of last pesticide spray) until 100% lodging is critical for reaching maximum yield potential and bulb quality. If onions die standing up, the risk of bacterial bulb rot increases. Therefore, we **recommend saving fungicides with best activity on SLB leaf dieback for last 2-3 sprays.**

ENSURE GOOD CONTROL ONION THRIPS

SLB is not the only affliction of onion that causes leaf dieback. **Onion thrips can cause serious leaf dieback**. For example, last year, the untreated onions in the border area of one of the Elba fungicide trials turned white and died standing up when hit by a thrips "tsunami". In a Cornell study conducted in Elba (Leach et al. 2020), insecticide for thrips + fungicide for SLB resulted in up to 27% fewer SLB symptoms than SLB fungicide alone. The laboratory component of this project demonstrated that when inoculated with SLB-contaminated thrips, 2-14% of plants became infected with SLB, which indicated that **onion thrips may vector SLB**. Although this percentage may seem minuscule, multiply that by 200 spores per SLB target spot and by 2-3 (or more) SLB spots per plant and 200 thrips per plant, and by 250,000 onion plants per acre and by 2500 acres of onions and you have billions of thrips that may inoculate onion plants with SLB. In Leach's study, reducing onion thrips feeding decreased SLB colonization by 2.3 to 2.9 times and leaf dieback by 40-50%. **SLB can favor stressed plants including those that are stressed from thrips feeding.** In 2020 Elba onion fungicide trial, skipping two applications of insecticide + SLB fungicide in mid-July resulted in 4.5 times less green foliage than weekly applications of SLB fungicide + insecticide (green foliage: insecticide + SLB fungicide weekly - 27%; skip 2 weeks of both – 6%; insecticide only – 3.5%). Of the muck onion growing regions in New York, thrips are by far the worst in Elba – more on improved thrips management in an upcoming issue of VegEdge.

AVOID DOWNY MILDEW

SLB readily invades the necrotic spot created during the third phase of downy mildew (DM) disease expression, and the DM-SLB disease complex can be extreme. **With declining efficacy of SLB fungicides, DM-SLB complex could be devastating. Stepping up DM prevention program may be an option, especially in pockets of muck with a history of DM when conditions are favorable for DM.** In 2015 DM fungicide trial in Elba, Ridomil Gold Bravo and Orondis active ingredient (oxathiapiprolin) were the best treatments, which reduced DM infection by 75% compared to the untreated. In the same trial, manzoceb reduced DM infection by about 50%.

EXAMPLE FUNGICIDE PROGRAM

It has become very challenging to put together a spray program with so many "limping" fungicides to work with. Can we even make it to the finish line? Hopefully, but it will require some strategy. We have developed an example of an 8-week spray program from 6-7 leaf (summer solstice) until 50% lodging (usual timing of last pesticide spray). It assumes only a 1-week ride with the momentum of Movento, and that an insecticide that is also incompatible with Bravo is used every week after that. **This program does not exceed more than 3 apps per FRAC or active ingredients and never uses more than two consecutive applications per FRAC/a.i. before rotating to a different FRAC/a.i.**. However, **it would be preferred to not use more than 2 apps per FRAC 3, at least in Elba**. SLB is certainly developing fungicide resistance to FRAC 3 in Elba, as performance of single FRAC 3 products in 2020 fungicide trial declined noticeably from prior year. Alternatively, FRAC 3 had very good activity against SLB in Oswego fungicide trial. FRAC use has varied from 1 to 5 apps of FRAC 3 per spray program across individual farms. In Elba in 2020, the majority of spray programs did not exceed 3 applications of FRAC 3. This example spray program strategically saves FRAC 3 fungicides for the end of the program for their superior ability to prevent SLB leaf dieback.

Due to space limitations here in VegEdge, the Example Onion Fungicide Program for Control of Leaf Diseases in Onion with Emphasis on Managing Fungicide Resistance and Selecting Fungicides by Disease Category in Western New York, 2021 can be found on the Onion page of the Cornell Vegetable Program website at https://cvp.cce.cornell.edu/.

For a print copy of the Example Onion Fungicide Program for Control of Leaf Diseases in Onion to be mailed to you, contact Christy Hoepting at 585-721-6953.

NY Sweet Corn Trap Network Report, 7/6/2021

Marion Zuefle, NYS IPM Program; from http://sweetcorn.nysipm.cornell.edu

Statewide, 23 sites reported this week. European corn borer (ECB)- E and ECB-Z were each caught at 4 sites, with a high count of 10 ECB-Z at the Unadilla site. Hybrid ECB were caught at both the Geneva and Seneca Castle site. Corn earworm was caught at 13 sites with 12 sites high enough to be on 5 or 6 day spray schedule (see table below). Still no fall armyworm (FAW) caught this season but we are starting to catch western bean cutworm (WBC) which was caught at four sites this week.

WBC emergence is forecast to be at 25% when 1319 degree days (base 50°F) have accumulated beginning on May 1st (see table below). Statewide, the degree day accumulation (May 1st, base 50°F) for sweet corn trap network sites ranges from 680-966 with an average of 846. Peak flight in NY usually occurs during the first week of August.

WNY Pheromone Trap Catches: July 6, 2021

Location	ECB-E	ECB-Z	ECB Hybrid	CEW	FAW	WBC	DD to Date
Batavia (Genesee)	0	0	NA	0	0	0	895
Bellona (Yates)	NA	NA	NA	NA	NA	NA	898
Brockport (Monroe)	0	1	NA	2	0	0	910
Collins (Erie)	NA	NA	NA	NA	NA	NA	831
Eden (Erie)	NA	NA	NA	NA	NA	NA	871
Geneva (Ontario)	0	0	1	3	0	0	904
Hamlin (Monroe)	NA	NA	NA	NA	NA	NA	865
Leroy (Genesee)	0	0	NA	0	0	2	885
Lyndonville (Orleans)	0	0	NA	4	0	0	849
Oswego (Oswego)	0	0	NA	0	0	0	746
Panama (Chautauqua)	0	0	NA	3	0	0	755
Penn Yan (Yates)	0	2	0	3	0	NA	861
Portville (Cattaraugus)	0	0	NA	1	0	0	713
Ransomville (Niagara)	3	2	NA	3	0	3	903
Seneca Castle (Ontario)	0	0	2	0	0	0	887
Williamson (Wayne)	0	0	NA	3	NA	NA	785

ECB: European Corn Borer; CEW: Corn Earworm; FAW: Fall Armyworm; WBC: Western Bean Cutworm; NA: not available; DD: Degree Day (base 50) May 1st accumulation Climate Smart Farming

Upcoming Events

Cornell Vegetable Program events are listed at CVP.CCE.CORNELL.EDU

Vegetable Pest and Cultural Management Field Meetings for Auction Growers

Yates – July 16, 2021 (Friday) | 7:00 - 9:00pm
Dale Martin farm, 3157 Sutherland Rd, Penn Yan, NY 14527

Seneca – July 23, 2021 (Friday) | 7:00 - 9:00pm
David Swarey farm, Boyce Rd, Ovid NY 14521

1.75 recertification credits approved in categories 23 (veg) and 24 (greenhouse). These courses will demonstrate pest management in fresh market vegetables in both field and greenhouse (high tunnel) vegetables; primarily for those growing for wholesale auction. A hands-on demonstration of weed, insect and disease identification in vegetables including management options such as inter-row cover crops, grafting and where appropriate, spray options will be used to educate growers. Judson Reid, Senior Extension Associate with the Cornell Vegetable Program along with CCE staff will instruct participants and facilitate peer-based learning. Details on each topic will focus on field observations at these farms.

7:00 Welcome

7:05 Weed Control in Row Crop Vegetables

- Why? – moisture competition; insect and disease management; Labor efficiency
- How? – cultivation; herbicides; inter-row cover crops: spring seeding or winter rye; pros- and cons

7:45 Tomato and Potato Disease Updates

- Late blight and early blight updates
- Grafting for improved root-zone disease resistance in greenhouse and high tunnels

8:15 Cucurbits

- Greenhouse cucumber grafting for vigor and yield
- Downy mildew management: cucumbers, cantaloupes and watermelon
- Cucumber beetle, squash bug, stink bug
- Powdery mildew resistance and effective fungicide programs

8:45 Questions and Answer, other farm specific crop observations, and food safety news

9:00 Adjourn

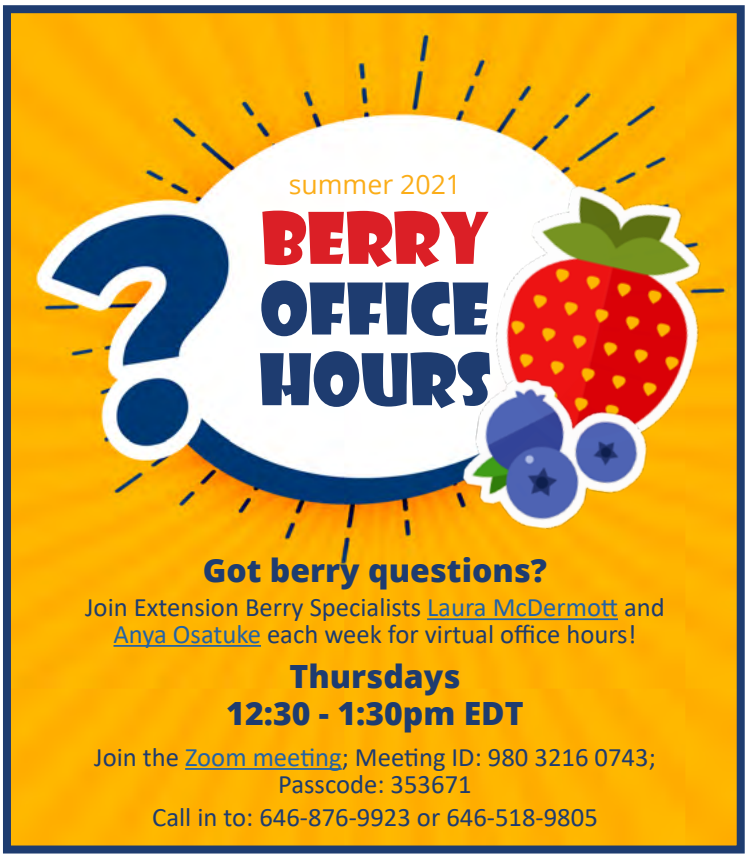
DEC Recertification Credit Requirements: Attendees will present an ID and record their certification ID number, print name and sign the Recertification Training Roster. The roster will be secured by a Cornell Vegetable Program representative and only the attendees who sit for the entire course will be awarded a certificate.

For more information about these courses, contact Judson Reid at 585-313-8912.

Bramble Pruning Essentials

Anya Osatuke, Cornell Cooperative Extension, Harvest NY

- Dead and diseased branches are removed at the base at any time of year. This prevents spread of disease and pests.
- Branches that are done fruiting are removed at 3-4 inches above the base in early spring and late autumn.
- New branches are pinched back 3-4 inches when they are 1.5 – 2 feet tall in spring or early summer. This prevents the branches from dropping to the ground and rooting at the tips.
- New canes are removed belowground using a shovel or tiller any time they emerge in an area where they are not desired.
- Bramble plantings should be between 1-2 feet wide to keep the thicket manageable.



New Website for Vegetable Disease Information

Margaret McGrath, Cornell University

The old Vegetable MD Online website is no longer being maintained. Instead, a wealth of disease ID and management info is now hosted at https://www.vegetables.cornell.edu/pest-management/. Much of the information from VegetableMD has been migrated to the new website and updated. There are 109 factsheets and photo pages on diseases and disorders of vegetable crops and herbs. Tables of fungicides for a few specific diseases are listed in the articles section of the website. There are also pages on biopesticides and lists of resistant varieties available. Postings to the website Vegetable News blog are also available by email subscription.

Cornell Cooperative Extension
Cornell Vegetable Program

480 North Main Street
Canandaigua, NY 14424

VEGEdge
YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

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VegEdge is the highly regarded newsletter produced by the Cornell Vegetable Program. It provides readers with information on upcoming meetings, pesticide updates, pest management strategies, cultural practices, marketing ideas and research results from Cornell University and Cornell Cooperative Extension. VegEdge is produced every few weeks, with frequency increasing leading up to and during the growing season.

Contact Us

VEGETABLE SPECIALISTS

Elizabeth Buck | 585-406-3419 cell | emb273@cornell.edu
fresh market vegetables, weed management, soil health

Robert Hadad | 585-739-4065 cell | rgh26@cornell.edu
farm food safety, organic, business & marketing, fresh market vegetables

Christy Hoepting | 585-721-6953 cell | cah59@cornell.edu
onions, cabbage, broccoli, garlic, pesticide management

Julie Kikkert, Team Leader | 585-313-8160 cell | jrk2@cornell.edu
processing crops (table beets, carrots, peas, snap beans, sweet corn)

Margie Lund | 607-377-9109 cell | mel296@cornell.edu
potatoes, dry beans, and post-harvest handling and storage

Judson Reid | 585-313-8912 cell | jer11@cornell.edu
greenhouses/high tunnels, small farming operations, fresh market vegs

PROGRAM ASSISTANTS

Sarah Caldwell | sv483@cornell.edu

Angela Ochterski | aep63@cornell.edu

Caitlin Tucker | 573-544-4783, cv275@cornell.edu

Emma van der Heide | ev247@cornell.edu

ADMINISTRATION

Peter Landre | ptl2@cornell.edu

Steve Reiners | sr43@cornell.edu

Cornell Cooperative Extension
Cornell Vegetable Program

For more information about our program, email cce-cvp@cornell.edu or visit CVP.CCE.CORNELL.EDU