Cornell Cooperative Extension | Cornell Vegetable Program

VEGEdge

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Plectosporium Blight Refresher

Elizabeth Buck, Cornell Cooperative Extension, Cornell Vegetable Program

Plectosporium Blight (Plectosporium tabacinum) is an infrequent fungal disease of cucurbit crops that is being reported in other parts of the state. Plectosporium tends to start this time of year and is favored by weather conditions of the past week.

Typically, we think of Plectosporium as a disease of pumpkins. In the Eastern US it also attacks summer squash, some gourds and zucchini (Fig. 1) – elsewhere it has been reported attacking other vine crops as well. There are no known resistant varieties available.

Few other diseases look like plectosporium. The most diagnostic feature is the slightly sunken, light colored (tan to white), diamond or spindle shaped lesions that plectosporium causes on the stems, petioles, and leaf veins. The water conducting tissues can become heavily covered in lesions. Leaf tissue between the veins may develop small, light colored spots.

The fruit is directly impacted by plectosporium and will exhibit many small, light colored spots and blemishes. The blemishes can sometimes look like silvery russeting on zucchini and pumpkins. Though the plectosporium fruit lesions do not extend deeply into the fruit tissue, they are unsightly and render most fruit unmarketable. In pumpkin, plectosporium lesions can cause bad handles and the fruit lesions tend to be invaded by secondary rots. So while the marked up pump-

Figure 1. Plectosporium lesions on a zucchini petiole and fruit. *Photo: Elizabeth Buck, CCE Cornell Vegetable Program*

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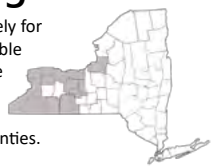
About VegEdge



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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.

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Contents

The next issue of VegEdge will be produced on July 31, 2024.

Sweet Corn Pheromone Trap Network Report

Marion Zuefle, NYS IPM, 7/23/24

Statewide, 29 sites reporting this week (see trap count table). European corn borer (ECB)-E was trapped at 7 sites and ECB-Z was trapped at 7 sites. Corn earworm (CEW) was trapped at 17 sites, with 15 sites high enough to be on a 4, 5 or 6-day spray schedule (see chart). Fall armyworm (FAW) was caught at 5 sites and Western bean cutworm (WBC) was caught at 26 of the sites.

It is recommended that all fields that are in the whorl or early tassel stage be scouted for WBC egg masses with a 4% threshold for processing sweet corn and a 1% threshold for fresh market sweet corn. WBC will usually lay eggs on the upper side of the top 1-3 leaves of pre-tassel corn, close to the leaf base. After tasseling has finished WBC seek out younger corn or dry beans. To scout for egg masses, check the top 3 leaves of ten corn plants in ten locations throughout the field. The eggs are easy to observe if you view the leaf while holding it towards the sun. The egg mass will appear as a distinct shadow (see photos in 7/10/24 issue of VegEdge, page 2). It takes between 5-7 days for eggs to hatch. It is critical that sprays are timed before the larvae have a chance to enter the ear. The egg mass will become purple in color approximately 24 hours before egg hatch.

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kins may seem like a novelty jack-o-lantern offering, marketing them is often a gamble due to quality and shelf-life issues.

Plectosporium requires cooler and wet conditions to infect plants. There tends to be more plectosporium cases in late August and September when we have dewy nights and lower overall temperatures. Fungal spores can be carried on wind currents and rain-splash. Once in a field the disease overwinters in the soil on crop debris. Growers who experience plectosporium should rotate away from vine crops for at least 3 years.

There are a few fungicide options available to treat plectosporium. Begin scouting for plectosporium after powdery mildew develops in the crop. Chlorothalanil (ie Bravo Ultrex, Group M5) can be used as a protectant, preventative fungicide as the weather conditions become more favorable for disease development. Note that plectosporium may be listed as a special "2ee" usage on a supplemental label for chlorothalanil. You must have a copy of that 2ee label to apply Bravo to treat plectosporium – the supplemental label may not come attached to the pesticide container.

For those without spray licenses, the Group 11 strobilurin fungicides pyraclostrobin (ie Cabrio EG) and trifloxystrobin (ie Flint Extra) can be sprayed in rotation with chlorothalanil on a 7 to 20 day basis. Only use the longer spray interval if the weather has been hot and dry. For those with spray licenses, the Roper formulations of mancozeb (Group M3) can also be used as a protectant. Note that not all versions of mancozeb have pumpkins and other susceptible crops listed on their label – check carefully before applying! Inspire Super (Groups 3+9) and Aprovia Top (Groups 3+7) are good control options and can be rotated with the Group 11 fungicides. ●

USDA Expands Funding Opportunities for Specialty Crop Growers to Help Offset On-Farm Food Safety Expenses for 2024 and 2025

USDA Farm Service Agency, 6/26/24

The U.S. Department of Agriculture (USDA) is expanding the Food Safety Certification for Specialty Crops (FSCSC) program to now include medium-sized businesses in addition to small businesses. Eligible specialty crop growers can apply for assistance for expenses related to obtaining or renewing a food safety certification. The program has also been expanded to include assistance for 2024 and 2025 expenses. Producers can now apply for assistance on their calendar year 2024 expenses through Jan. 31, 2025. For program year 2025, the application period will be Jan. 1, 2025, through Jan. 31, 2026.

Program Details

FSCSC assists specialty crop operations that incurred eligible on-farm food safety certification and expenses related to obtaining or renewing food safety. FSCSC covers a percentage of the specialty crop operation's cost of obtaining or renewing its certification, as well as a portion of related expenses.

Eligible FSCSC applicants must be a specialty crop operation, meet the definition of a small or medium-size business and have paid eligible expenses related to certification. A small business has an average annual value of specialty crops sold by the farm during the three-year period preceding the program year of no more than $500,000. A medium-sized business average sales range is at least $500,001 but no more than $1,000,000.

Specialty crop operations can receive the following cost assistance:

- Developing a food safety plan for first-time food safety certification.
- Maintaining or updating an existing food safety plan.
- Food safety certification.
- Certification upload fees.
- Microbiological testing for products, soil amendments and water.
- Training.

FSCSC payments are calculated separately for each eligible cost category. Details about payment rates and limitations are available at farmers.gov/food-safety.

Applying for Assistance

Interested applicants have until Jan. 31, 2025, to apply for assistance for 2024 eligible expenses. FSA will issue payments as applications are processed and approved. For program year 2025, the application period will be January 1, 2025, through January 31, 2026. FSA will issue 50% of the calculated payment for program year 2025 following application approval, with the remaining amount to be paid after the application deadline. If calculated payments exceed the amount of available funding, payments will be prorated.

Specialty crop producers can call 877-508-8364 to speak directly with a FSA employee ready to assist. Visit farmers.gov/food-safety for additional program details, eligibility information and forms needed to apply. ●

CROP Insights

Observations from the Field and Research-Based Recommendations

BEETS

According to the 2022 Census of Agriculture, New York is the #1 beet producing state (harvested acres) in the US! Harvest of the 2024 crop is well underway for both fresh market and processing. Disease detection and management is important for the remainder of the season with harvest going well into the fall. Cercospora leaf spot (CLS) is the most common and typically appears in mid-to late July. Symptoms are initially small, necrotic lesions surrounded by a red to purple margin in a red table beet cultivar (photo). In a yellow cultivar, the margins of lesions are tan. CLS lesions have a tan to gray center on all cultivars. When the lesions are observed through a hand lens, tiny black pinpoint-like structures called pseudostromata (Fig. 1) are visible carrying spores called conidia. Lesions eventually coalesce and cause defoliation. For more information and photos of CLS and other beet diseases see https://www.vegetables.cornell.edu/crops/beets/ – JK

Figure 1. CLS lesion observed with a 10x hand lens. *Photo: J. Kikkert, CVP*

CARROTS

Our mid-season survey of processing carrots conducted this past week did not detect significant leaf disease. However, the recent humidity and prolonged periods of leaf wetness are favorable for infection. Bacterial lesions are small yellow areas on the leaflets with brown, dry centers often surrounded by a yellow halo. Copper is labeled for Bacterial leaf blight. Cercospora leaf spot, caused by the fungus *Cercospora carotae*, is prevalent during hot and humid weather. Cercospora lesions are small, circular, tan, or gray spots with a dead center which appear along the leaf margins causing them to curl. The Cercospora fungus attacks younger leaves. Alternaria leaf blight caused by the fungus *Alternaria dauci*, first appears as deep brown to black irregular spots on the margins of the leaflets. Lesions on petioles and stems are deep brown and girdle the stems, killing them. As the disease progresses, entire leaflets may shrivel and die. Lesions are more prevalent on older foliage. There are several fungicides labeled for carrots as outlined in the 2024 Cornell Vegetable Guidelines. Choices should be based on which disease(s) you are trying to control, cost, and PHI. – JK

CUCUMBERS

Starting to see some phytophthora kicking up on dropped fruit in fields with known histories. Angular leaf spot is a bacterial disease best treated with copper. Angular can cause blocky lesions in the center of the leaf and is distinguished from downy mildew by having bright white lesions surrounded by yellow haloes. Downy is blocky yellow checkers that do not cross large veins and will produce grayish spores on the undersides in humid conditions. Many, but not all, of the downy-effective materials will help with phytophthora in cukes.

We tend to see second generation striped cuke beetles about now. Also seeing spotted cuke beetles. Both can be managed with pyrethroids. Pyganic is the organic option but it does lack oomph. Deterrence with Surround improves control. If you've not already put old plantings plagued with bacterial wilt under, do so now before the cuke beetles reemerge. – EB

DRY BEANS

Most dry beans are now in or past bloom stages, so white mold management should now be considered. An initial application of Omega 500F is recommended followed by a second application of Endura 70 WDG. The first application should be made at the early bloom stage. Japanese beetles and Mexican bean beetles have been seen in dry beans this week. While Japanese beetles will eat foliage, it is often not at high levels. However, Mexican bean beetle can cause severe damage if left untreated. Monitor fields. – ML

Western Bean Cutworm Report

Western bean cutworm trapping has begun at 16 locations in the region (Table 1). Moth numbers have

Table 1. Western bean cutworm adult moth numbers by date for each dry bean trap location.

Dry Bean Location	July 3	July 9	July 16	July 23	Cumulative Moths
Avoca Hill East (Steuben Co.)	0	0	38	284	**322**
Avoca Hill West (Steuben Co.)	1	5	23	29	**58**
Avoca Valley (Steuben Co.)	0	1	27	56	**84**
Caledonia (Livingston Co.)	3	23	29	66	**121**
Churchville (Monroe Co.)	5	45	70	57	**177**
East Bethany (Genesee Co.)	NA	7	82	96	**185**
LeRoy (Genesee Co.)	NA	7	101	244	**352**
North Chili (Monroe Co.)	1	0	11	16	**28**
Pavilion (Genesee Co.)	1	7	53	97	**158**
Penfield (Monroe Co.)	NA	7	33	99	**139**
Penn Yan North (Yates Co.)	NA	4	4	76	**84**
Penn Yan South (Yates Co.)	NA	3	3	118	**124**
Scottsville (Monroe Co.)	0	4	14	41	**59**
Wayland Hill (Steuben Co.)	0	13	45	124	**182**
Wayland Valley (Steuben Co.)	3	2	10	96	**111**
Wyoming (Wyoming Co.)	11	77	82	135	**305**

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skyrocketed at many locations this week, with all but one location passing the 50 cumulative moth threshold recommended for scouting. Overall moth numbers appear to be high this year compared to recent years, and we will likely reach peak flight this week or next. (Project funded by the New York Farm Viability Institute and the NYS Dry Bean Endowment and led by Margie Lund, CVP)

EGGPLANT

Seeing two spotted spider mites take off. Look for webbing or mites tucked up alongside heavy veins on the underside of leaves as you rock it in the sun, or for stippling and slightly yellowed or bronzed leaves with a mealy texture on the underside. Scouting lenses really help here. Control options are limited without a spray license: Acramite has a (3 day PHI), Portal (1 day PHI). Horticultural oils and soaps can smother mites if you can get good coverage but both risk phytotoxicity (burning) on the foliage. More options for restricted use but note that many have 7 day PHIs or are broad-acting pyrethroids that tend to kill beneficials and can themselves flare aphid and mite issues. Agri-mek is a non-pyrethroid, mite-specific restricted use product that produces good results for two spotted spidermites. – EB

Verticillium is an annual problem in eggplant. There is little tolerance so nearly every planting will show some degree of verticillium. I think of verticillium as a disease of halves. It will cause wilting that progresses to pale green then yellow and crispy brown. Symptoms are more pronounced on one side of a leaf than the other, one side of a branch, one stem more than another – one half goes down more strongly than the other. Verticillium is a common soil borne fungus favored by excess soil water that slowly clogs up the vasculature tissue. There is nothing to be done to treat for it once you see symptoms. Many plants will fight through it so long as crop health and nutrition is otherwise good and moisture is carefully managed. It is not worthwhile economically or environmentally to try to treat roots or soil for verticillium in eggplants. – EB

ONIONS

With 2-3 inches of gentle rainfall dropped across all regions last week, onions are bulbing nicely! Direct seeded onions have 7-10 leaves and 0.5 to 2 inch bulbs. Leaf tipburn is just starting to occur as nutrients are moving from the leaves into the bulbs. Harvesting of transplanted fields continues.

Last week, most muck onion growers made their first FRAC 3a + P07 (e.g. Viathon + Tilt or Tilt + Rampart/Reveille) fungicide application (the best we've got against SLB), timed following significant rain event and ahead of tipburn to set the stage for a successful SLB control for the remainder of the season. Although we have not yet scouted Wayne and Oswego at time of this update, scouting this Monday in Elba muck found Stemphylium leaf blight (SLB) to be mostly dried up and secondary. Whether it was because the FRAC 3a + P07 fungicides controlled SLB or weather conditions were not favorable for SLB is tricky to determine. Maybe it was because of both. Last week primary SLB target spots appeared water-soaked and/or on green leaf tissue (Fig. 2A & B). This week, such lesions appeared dried up with very little sporulation (Fig. 2C). The only time that SLB appeared to be "showy" with purple target spots and black spores was when it was invading lesions caused by IYSV (Fig. 2D) or necrotic leaf tissue infected with bacterial disease, which we consider to be secondary, because SLB is attacking tissue that is already dead. Another indication that SLB is secondary or has been controlled with fungicides is that there are no or very few new target spots on green tissue.

Figure 2. Last week, we saw some primary SLB in onion fields, which may be characterized by a water-soaked appearance (A) and when target spots occur on green leaf tissue (B). A week later, an indication that SLB is controlled and/or secondary is when the target spots appear dried up on necrotic tissue (which may have originally been green the week prior before SLB killed it) and very little, if any sporulation is evident (C). Although we would normally consider SLB target spots that are purple and black in color as primary, when they occur on the necrotic tissue of IYSV lesions or onion leaves that are infected by bacterial disease, we generally consider these lesions as secondary, because they are attacking tissue that is already dead. *Photos: C. Hoepting, CVP*

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Botrytis leaf blight (BLB) halo lesions continued to decline to < 1 BLB halo lesion/leaf in most fields this week. **BLB necrotic spots increased in almost all fields this week**, as this is typically the time of year that they begin to increase. Although they remain at < 5 spots/leaf in most fields, we expect them to increase throughout August. **Our preliminary data suggests that onion plants can tolerate < 46 BLB necrotic spots/leaf before they impact yield.** For more information on BLB halo lesions and BLB necrotic spots, **see article on page 8**. **We finally took the time to write a comprehensive article about BLB necrotic spots – they are important, slightly biologically different than BLB halo lesions and can and should be controlled with fungicides.**

Unfortunately, **onion thrips continue to be a force to be reckoned with in Elba**, and IYSV continues to increase, despite 3 inches of rain and aggressive insecticide programs! The growers are dealing with them accordingly and creatively. Fortunately, the timely rainfall appeared to destress the onion plants enough that they appear to be sustaining higher than desirable levels of thrips feeding, at least for now. Alternatively, the s**couting fields in Wayne and Oswego continue to enjoy low thrips pressure with the "momentum of Movento".** – CH

POTATOES

Colorado potato beetles are active in potatoes this week, and aphids have started to show up in low numbers. Early blight is also starting to show up in some potatoes, and late blight remains a risk due to confirmed cases in Ontario Canada. It is important to remain consistent with fungicide treatments and monitor for any signs of disease. No new late blight has been reported this week. – ML

SNAP BEANS

Fields with a history of Sclerotinia white mold and with dense canopies are most at risk for developing white mold. Rainy weather is highly favorable! Flowers become infected and disease spreads to the rest of the plant. A first fungicide should be applied to fields at risk when there is an average of 1 open flower/plant in 10% of the plants; a second application may be considered at 100% bloom (this may happen within a day or two in some varieties in warm weather). Research in the Pethybridge group at Cornell focused on the products Endura, Topsin 4.5 FL, and Omega 500F. Each of these products is highly efficacious when applied at optimal timing and there was no significant difference in the disease control between the products. In further teasing out the optimal application timings, our research has shown that the optimal timing of Topsin 4.5 FL is at 10% bloom, and that this product is not effective when applied at 100% bloom. Furthermore, there is no benefit to a second application. Conversely, disease control with Omega 500F was not related to timing (10% or 100% bloom) and there was no benefit from a second application even when applied at 100% bloom. For growers who were not able to put on a spray at 10%, then Omega 500F would be the choice product to use. The timing of the other possible fungicides was not tested. For organic growers, the most efficacious and reliable product from year to year is Double Nickel (*Bacillus amyloliquefaciens* strain D747). Both the LC and 55 formulations are equally effective. While labeled at the rate of 1 to 2 quart/acre, there was no benefit of the higher rate, and thus 1 quart/acre is recommended. – JK

SQUASH

Keep an eye on squash bug pressure. Remember that they can transmit yellow vine decline, a bacterial infection that causes wilting, whole plant yellowing, and plant death. Squash bugs are hard to kill as adults. Flag a couple clusters of coppery colored eggs (more common on leaf underside than top) and treat once they begin to hatch. First stage nymphs will look a little spider-like with long black legs and greenish bodies. Older nymphs are blueish-gray. – EB

SWEET CORN

Field crops colleagues are reporting the appearance of Northern corn leaf blight and gray leaf spot in field corn. These diseases can infect sweet corn also. Even though it seems a bit early, now is the time to start scouting and management for these and other diseases in corn. – JK

Western bean cutworm counts are high. Scout for WBC egg masses; don't be caught off-guard and unprotected! Eggs turn purple within 24 hours of hatching. They then progress down to the ear. These guys can be destructive, be sure you get your timing right. – EB

Two Spotted Spider Mites in High Tunnels

Judson Reid, Cornell Cooperative Extension, Cornell Vegetable Program

Keeping tomatoes under the cover of a greenhouse or high tunnel is a fantastic season extension and disease prevention tool. Dry foliage, warmer temperatures and no rain-tomatoes can thrive! These conditions also help certain pests thrive; in particular Two Spotted Spider Mite (*Tetranychus urticae*), often simply called Spider Mites.

Spider Mites are pests favored by the warm, dry environment of a greenhouse or high tunnel. Outside they can be a problem, particularly on watermelons, eggplant and strawberries, but rain and beneficial insects can keep their numbers in check. Speaking of insects, it is important to know that mites are not insects, and thus most insecticides are not effective in controlling them. More on this later.

Scouting for mites begins by scouting for their damage. Piercing and sucking the underside of the leaf, Spider Mite damage will often appear to be pin-point white or yellow dots, which eventually grow together into large yellow sections (Fig. 1). Once this type of damage is found, search the underside of the leaf for small (0.5 mm!) yellow ovals, with two black spots (Fig. 2). The mature females are the easiest to see, and rest assured there are many unseen younger stages and eggs corresponding to the larger adults. An infested tomato leaf may have hundred of mites! A 10X hands-lens is really helpful to identify Spider Mites. They can also be detected by feel: rubbing a finger and thumb together along the underside of the leaf produces a gritty or sandy sensation. In high numbers Spider Mites produce webs on-top and between leaflets. They can easily be 'spotted' traveling these pestiferous highways.

Life cycle basics: Spider Mites overwinter in New York on plant debris, soil and greenhouse structures. Females can lay up to 70 eggs in their lifetime and eggs hatch in 3-10 days depending on temperature. These become viable adults in as little as 2 weeks. Spider Mites do not fly, but use webs, plants and people to transport themselves.

Control begins with prevention. If mixing ornamentals (such as hanging baskets) with tomatoes, inspect flowers and have mite management in mind. Many growers proactively deploy beneficial mites and insects into flower baskets prior to hanging above tomatoes. Further these beneficials (or biologicals) can be released directly into the tomato crop as well; the sooner the better! Common biologicals to control mites in tomatoes include:

- *Amblyseius californicus*
- *Amblyseius andersoni*
- *Feltiella acarasuga*

Are there organic sprays for Spider Mites? Yes, oils in particular may reduce numbers when applied with pressure to the underside of the leaf. However, biologicals offer greater potential control and don't have a phytotoxicity risk (burning of foliage). This makes them the control option of choice for many organic and conventional growers.

There are conventional spray options to control Spider Mites indoors as well, but remember to double check labels for greenhouse prohibitions (which includes high tunnels in NYS), both Spider Mites and Tomatoes must appear together on the label.

Figure 1. Piercing and sucking the underside of the leaf, Spider Mite damage will often appear to be pin-point white or yellow dots, which eventually grow together into large yellow sections. *Photo: J. Reid, CVP*

Figure 2. Adult Spider Mites (yellow circles) and eggs are abundant on the underside of this tomato leaf. Look for yellow ovals with two black spots, and clear, white round eggs. *Photo: J. Reid, CVP*

Conventional sprays labeled for Spider Mite control in greenhouse tomatoes include:

- Floramite SC (bifenzate) 3 day preharvest interval, no more than 2 applications per crop
- Pylon (chlorfenapyr) 0 day preharvest interval, no more than 3 applications per crop, only for tomatoes varieties > 1" diameter
- Akari (fenpyroximate) 1 day preharvest interval, no more than 2 applications per crop

This last material was the subject of some dispute at a recent twilight meeting. The same active ingredient, at the same concentration, is found in Portal XLO. This product is labeled for outdoor produce and there was some concern over its use in greenhouse. Triple checking the label, an entomologist and pesticide educator, we've concluded that there is **not** a prohibition for Portal XLO from greenhouse use, making it a convenient option for field produce growers who may need both outdoor and indoor applications. An advantage of the Akari label is more specific greenhouse application instructions. ●

Botrytis Leaf Blight (BLB) Necrotic Spots of Onion Are Driving Us Crazy!

But They Are Important and Can Be Controlled with Fungicides

Christy Hoepting, CCE Cornell Vegetable Program, and Frank Hay, Cornell AgriTech

This article is complimentary to:

- **The information presented by Christy and Frank at the Muck Onion Twilight Meeting in Oswego on June 20, 2024.** Please contact Christy if you would like the handouts from that meeting (charts of key results from the fungicide trials, Plant Disease Management Reports including additional results and photo file of Wolcott trial).
- **Part I (FRAC 3) and Part II (FRAC M5, 2, 7, 9, 11, 12, 19 & P07) of Stempylium leaf blight (SLB) articles that appeared in July 10 and July 17 issues of VegEdge, respectively.** Part I includes **Summary of Fungicide Recommendations for SLB in 2024.**
- **The 2024 version of Cornell Onion (Dry Bulb) Fungicide "Cheat Sheet" for Control of Leaf Diseases in New York** found on the Cornell Vegetable Program website: CVP.CCE.CORNELL.EDU

BLB necrotic spots do not have silvery halos

- Botrytis leaf blight (BLB) necrotic spots are bright yellow round spots that become yellowish-white as they enlarge. They have a defined white border and range from pin-prick to 1-3 mm in size.
- BLB necrotic spots do not have silvery halos like BLB halo lesions do (Fig. 1).

BLB necrotic spots are driving us crazy!

- Anybody who has scouted onions with me or conducted an onion fungicide trial evaluation knows that these BLB necrotic spots drive me crazy!
- **When I was first trained to identify BLB of onion** over 20 years ago, **I was taught to look for a tiny round straw-colored spot about pin-prick in size that was surrounded by a silver halo.** This is what I refer to as a **BLB halo lesion** (Fig. 1. Top right, Bottom left).
- Eventually, I learned that it **was not uncommon for a BLB halo lesion to just have a silvery halo without a yellow center** (Fig. 1. Bottom left). I attributed this to less favorable disease conditions. Similarly, I learned that **when BLB halo lesions age, the yellow center can sometimes split** (Fig. 1. Bottom left) **and the silvery halo can look more like a sunken splotch** (Fig. 1. Bottom right).
- Back when Martha Mutchler was breeding onions for BLB resistance (2007-2012), I assisted her technicians rate a trial for BLB and they taught me that BLB included pin-prick to 1 mm sized yellow spots without silvery halos. This was the **first that I had heard of BLB lesions without halos**. I called them BLB necrotic spots.

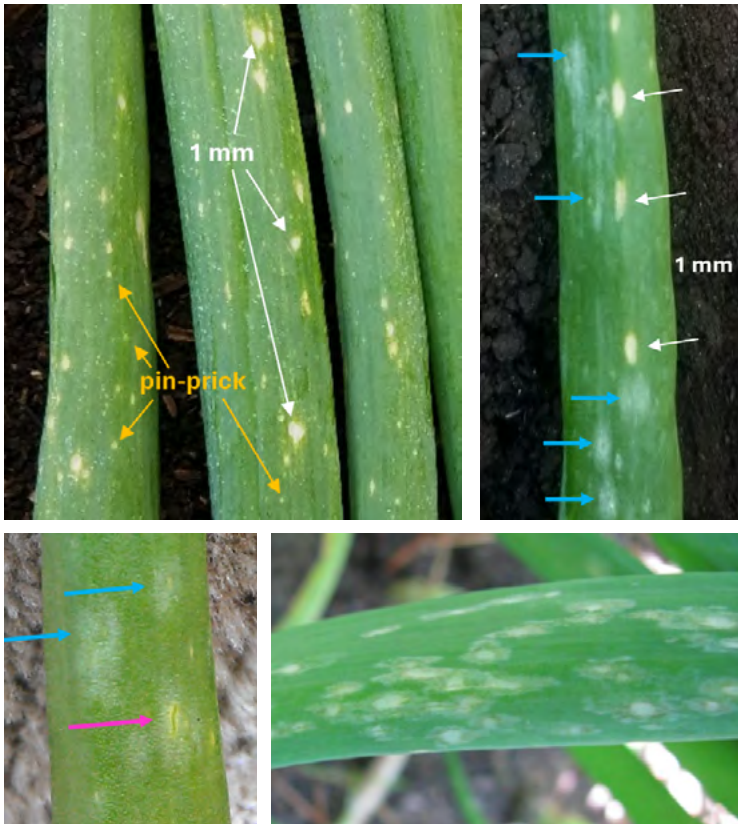

Figure 1. Top left: Botrytis leaf blight (BLB) necrotic spots are bright yellow round spots with a defined border that become yellowish-white as they enlarge from pin-prick (yellow arrows) to 1-3 mm (white arrows). BLB necrotic spots do not have silvery halos like BLB halo lesions (blue arrows) do (Top right). Bottom left: Old BLB halo lesions may have a split center (pink arrow) or the center may expand to 1 mm in size, be white in color and be surrounded by a sunken halo (bottom right). *Bottom right photo: Lindsey du Toit, Washington State University. All others: C. Hoepting, CCE*

- **When scouting onions and evaluating my on-farm onion fungicide trials for BLB halo lesions, I noticed too many BLB necrotic spots to ignore.**
  - Initially, I used the size and density rating scales developed by Mutschler to evaluate BLB necrotic spot data in my fungicide evaluations (2015-2018) but did not find them very useful. Over the years, I developed several versions of a BLB necrotic spot scale in attempts to capture differences among treatments (2019-2022).
  - In 2023-2024, my team converted BLB necrotic spot counts to 7-point and 100% severity scales that resulted in good treatment separation for trial evaluations and can be used interchangeably during scouting.
- **It was clear that fungicides reduced BLB necrotic spots compared to the nontreated in the fungicide trials, and there were always significant differences among treatments, which indicated that BLB necrotic spots were important and should not be ignored.**

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- What drove me crazy was that **BLB halo lesions and BLB necrotic spots were not controlled the same by the same fungicide treatment.**
- WHAT? Are you kidding me? If BLB halo lesions and BLB necrotic spots are different forms of the same disease, then why in the world would fungicides have vastly different efficacies against them?
- **Sometimes, control of BLB necrotic spots and SLB was more similar than control of BLB halo lesions and BLB necrotic spots.** This often made me question whether BLB necrotic spots were actually young/early SLB? Again, driving me crazy!

- **In 2019, we finally included BLB necrotic spot counts in the onion scouting program.**
  - We learned that **BLB necrotic spots usually first appear in July once bulbing has begun but remain at low levels (< 5/leaf) until August when they can blow up and reach 25-50/leaf or more in some fields.** Although BLB necrotic spots could blow up earlier if conditions were especially wet.
  - By comparison, **BLB halo lesions usually appear in mid-June when onions have 3-4 leaves.** BLB halo lesion counts often increase for a couple of weeks and peak around the end of June/beginning of July before they decline. Often, they disappear in July and only sometimes reappear in August.
- Over the years, I have probably given Frank Hay **several hundred onion leaves with classic BLB necrotic spots and BLB halo lesions for him to try to identify the pathogen that caused the spots**. However, **spores of *Botrytis squamosa* (the causal agent of BLB halo lesions) have never been isolated from these spots**, either by grow out tests or by incubating tissue pieces on artificial media. We now know that spores of *B. squamosa* do not grow in lesions that occur in green healthy tissue.

So, what do we think is the cause of BLB necrotic spots?

Short answer: *Botrytis squamosa* (season-long) and *B. cinerea* (only early in season)

BLB is a two-phase disease that causes both halo lesions and necrotic spots.

- **First phase BLB halo lesions. *B. squamosa* is only a weak pathogen of young, healthy onion leaves.** After a young onion leaf is infected and penetrated by *B. squamosa*, the onion leaf defends itself by rapidly (within 6-12 h of penetration) collapsing its cells around the pathogen. This contains the pathogen and results in tiny BLB halo lesions. The longer the periods of leaf wetness, the larger the BLB halo lesions. Spores of *B. squamosa* do not grow from lesions that occur on green living tissue.
- **First phase BLB necrotic spots**. *B. cinerea* cannot invade healthy onion tissue but causes lesions due to the release of pectolytic enzymes when the spores germinate on the leaf surface. This causes BLB necrotic spots. *B. cinerea* does not live and sporulate within the BLB necrotic spots. On occasion, Hay *et al.* have isolated *B. cinerea* from the surface of BLB necrotic spots.
- **Second phase BLB necrotic spots and blast.** *B. squamosa* invades older/mature leaf tissue more aggressively because it does not have the resistance response (rapid cell collapse to contain pathogen) as young healthy leaves.
  - This is why BLB necrotic spots increase in prevalence once outer leaf dieback and tipburn occur naturally during bulbing.
  - It also explains why BLB necrotic spots tend to be more concentrated towards leaf tips than leaf axils, because older leaf tissue is near the leaf tip.
  - *B. squamosa* can invade and sporulate in mature onion leaf tissue.
  - When 24 h periods of leaf wetness occur, rapid lesion and sporulation of *B. squamosa* can cause leaf "blast" and excessive leaf dieback.

BLB necrotic spots are not caused by Stempylium leaf blight (SLB).

- Only on rare occasion were spores of *S. vesicarium* or *Alternaria spp.* isolated from BLB necrotic spots on onion leaves.
- Onion plants grown in a humidity chamber that were artificially inoculated with *S. vesicarium* developed symptoms that could be confused with BLB necrotic spots (Fig. 2).

Although minor, Hay et al. identified some BLB necrotic spots to be caused by another species of *Botrytis*, *B. mali*.

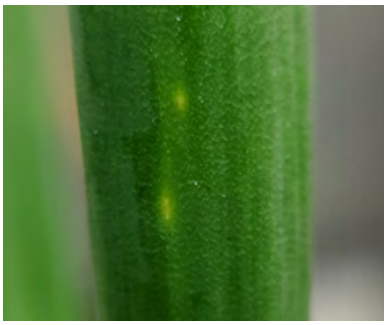

Figure 2. Initial lesions caused by Stemphylium leaf blight on onion leaf. They are yellow and pin-prick in size like Botrytis leaf blight (BLB) necrotic spots, but unlike BLB necrotic spots, initial SLB spots do not have defined borders, they tend to be more oblong in shape than round and they have a greenish border. *Photo: Natalia Pineros-Guerrero*

2023 Research Highlights on BLB necrotic spots

- In 2023, **two on-farm onion fungicide trials** were conducted in the variety Hamilton with natural disease infection, one in Elba and the other in Wolcott. Disease pressure of BLB necrotic spots was moderate-to-high with the nontreated having 96 spots/leaf in early August. BLB halo lesion pressure was too low to get meaningful results.
- **Best control of BLB necrotic spots: FRAC 3g a.i. prothioconazole applied as Proline 5.7 fl oz/A resulted in ~ 80% control** (reduced 96/63 spots/leaf in nontreated to

continued on page 10

continued from page 9

18/13 spots/leaf in Elba/Wolcott trials), which was significantly better than all other treatments in Elba trial. This a.i. has never been used/labeled in onion.

- **Second-best control of BLB necrotic spots: Viathon 3 pt/A (FRAC 3c + P07) + Tilt 8 fl oz/A (FRAC 3a) resulted in 65-73% control.**
  - In Wolcott, Viathon + Tilt was significantly better than Tilt, Viathon and FRAC P07 (e.g. Rampart).
  - In Elba, Viathon + Tilt was not significantly different than Tilt, but it was significantly better than Viathon and FRAC P07 (e.g. Rampart).
  - Doubling the rates of 3a and 3c while keeping the rate of P07 the same, did not significantly improve control of BLB necrotic spots.
  - Addition of Bravo 3 pt to Viathon + Tilt numerically reduced BLB necrotic spots by 30% (~ 10 spots/leaf) over Viathon + Tilt.
- **Single FRAC 3 products provided good control (~ 40-50%) of BLB necrotic spots.** These included Quadris Top (FRAC 3b + 11), Inspire Super (FRAC 3b + 9), Tilt (FRAC 3a) and Viathon (FRAC 3c + P07), as well as never used/labeled in onion FRAC 3e (flutriafol, applied as Topguard) and FRAC 3f (tetraconazole, applied as Domark).
- **FRAC M5 Bravo also provided good control (46-55%) of BLB necrotic spots.** This FRAC group has a very low risk for fungicide resistance and the high rate (3 pt) may be used up to 6 times per crop.
- **FRAC P07 (e.g. Rampart, Reveille) provided fair-to-good control (38-54% of BLB necrotic spots.** This FRAC group has a low risk of fungicide resistance.
- **FRAC 2 Rovral had no activity on BLB necrotic spots in Wolcott and provided only poor control (~30%) in Elba.** There was no significant difference between the labeled rate (1.5 pt/A) and the 2x rate (3 pt/A) in either trial.
- **FRAC 9 Scala 18 fl oz/A provided poor-to-fair control (36%) of BLB necrotic spots in Wolcott** (not trialed in Elba).
- **Efficacy of FRAC 7 a.i.s could not be determined** because they were always a part of a premix or tank mix with other a.i.s that had activity on BLB necrotic spots.
  - Generally, there were **no differences among FRAC 7 premix tank mixes Luna Tranquility/Miravis Prime + Rovral/Oso for BLB necrotic spots, which resulted in 28-42% control (poor-to-fair).**
  - However, **Luna Tranquility (FRAC 7(1) + 9) + Cannonball (FRAC 12) resulted in slightly better control (58%) of BLB necrotic spots** in Wolcott, which was second to Viathon + Tilt. Although, **alone FRAC 12 had only poor activity (~20-30%) on BLB necrotic spots.**
- In the Elba trial, there were significant correlations between BLB necrotic spots, leaf dieback, green foliage and yield: As BLB necrotic spots increased, leaf dieback increased, while green foliage and yield decreased. As an initial rough estimate, it appears that **yield may be reduced when BLB necrotic spots reach or exceed 46 spots/leaf due to excessive leaf dieback.**
  - Of the 18 commercial onion fields in the 2023 onion scouting program, BLB necrotic spots only exceeded 46 spots/leaf in 3 (= 17%).
- **We question whether BLB necrotic spots are developing fungicide resistance to FRAC 2, 3, 7 and/or 9**, because the efficacy of these fungicides in our trials appears to have declined in a similar manner but to a lesser extent as we have seen SLB develop resistance to these fungicides. These FRAC groups are rated as medium to high risk for fungicide resistance and BLB necrotic spots have had ample exposure to them through their use for SLB over the past decade to develop fungicide resistance.
  - **The less than normal control of BLB necrotic spots in 2023 fungicide trials could also be due to higher disease pressure.**
  - Unfortunately, we cannot test BLB necrotic spots for fungicide resistance until their spores can successfully be isolated from infected onion leaves. Again, driving us crazy!

Fungicides do not control BLB necrotic spots and BLB halo lesions equally

- **CONTROL BOTH** BLB halos and BLB necrotic spots – **FRAC M5 Bravo.**
- **CONTROL BLB halo lesions/ NO CONTROL of BLB necrotic spots – FRAC M3 mancozeb** and **FRAC 7 Merivon (7(4) + 11)**. Note, mancozeb is only effective when BLB halo lesions are 3.0 per leaf or less.
- **CONTROL BLB necrotic spots/ NO CONTROL of BLB halo lesions – FRAC 3** (e.g. Viathon, Tilt, Quadris Top) and **FRAC P07** (e.g. Rampart).
  - Note, that in our fungicide trials, Viathon + Tilt sometimes has had significantly more BLB halo lesions than the non-treated. This may be because BLB halo lesions only occur on healthy green tissue and since Viathon + Tilt controls SLB and BLB necrotic spots, there is more healthy green tissue for BLB halo lesions to occur.
- **Best control of BLB halo lesions - FRAC 29 Omega**, followed by **FRAC M5 Bravo** and **FRAC 7 premix fungicides** (e.g. Luna Tranquility, Miravis Prime).
- **Best control of BLB necrotic spots - FRAC 3 + 3 tank mixes**, followed by **FRAC M5 Bravo**. Under lower disease pressure (e.g. in fungicide trials prior to 2023), **FRAC 7 premix fungicides** have had good activity on BLB necrotic spots.
- **Growers need to include fungicides appropriate for the type and prevalence of BLB lesion (halo vs. necrotic spot) as informed by scouting data.** Many of the fungicides with activity on BLB also have activity on SLB and downy mildew – see 2024 Onion Fungicide Cheat Sheet for details.

References:
Alderman, S.C., and Lacy, M.L. Influence of leaf position and maturity on development of Botrytis squamosa in onion leaves. Phytopathology 74, 1461-1463.

University of Illinois Extension Report on Plant Disease. Onion Leaf Blights. RPD No. 931, September 1990. https://ipm.illinois.edu/diseases/rpds/931.pdf

Upcoming Events

Niagara Region Vegetable Meeting

August 14, 2024 (Thursday) | 5:00 pm - 8:00 pm
Root Down Farm, 5850 Shimerville Rd, Clarence Center, NY 14032

Starting at Root Down Farm, hear late season disease management updates in peppers and cole crops, plus current best management practices to limit fungicide resistance. Potato variety recommendations and disease control questions in potatoes will be addressed.

Then we'll head to Kreher's beet field to view and discuss alternative weed control technologies. The beet field is an on-farm demonstration of various flame weeding protocols in comparison with stacked tool cultivation equipment. One or two weeding robots will be on-hand for live demonstrations and discussion of the technology's current abilities and future potential. Industry updates and a review of late summer disease management in squash will be provided too. See the full meeting agenda at CVP.CCE.CORNELL.EDU

2.0 DEC credits will be available in categories 23, 1a, and 10. FREE! Contact Elizabeth Buck at 585-406-3419 with questions.

Bejo Open Days 2024

August 19, 2024 (Monday) | open 9:00 am - 4:00 pm with field tours at both 10:00 am and 11:00 am
4188 Pre Emption Rd, Geneva, NY 14456

Take a ***Behind the Scenes*** look into Bejo—Bees, BMOX, and their latest innovations in Breeding! Of course, they will also have their Kitchen Garden, raised beds and field trials. Questions? Please email media@bejoseeds.com

Chipping Potato Twilight Meeting

August 20, 2024 (Tuesday) | 5:00 pm - 6:00 pm
Mahany Farms, 10046 NY-36, Dansville, NY 14437

Join us for a brief, on-farm meeting including insect pest updates and viewing of the chipping potato variety trial. 1.0 DEC credits in categories 10, 1a, and 23 will be offered. Dinner follows!

FREE! No pre-registration required. See the agenda online.

Cornell Vegetable Variety Showcase and Pathology Twilight Meeting

August 21, 2024 (Wednesday) | 5:00 pm - 8:00 pm
Homer C. Thompson Vegetable Research Farm, 133 Fall Creek Rd, Freeville, NY 13068

The event will include tours of commercial variety trials and Cornell breeding plots for tomato, pepper, squash, cucumber, and potato, as well as a vegetable disease field walk, variety tasting, and dinner. 1.75 DEC credits in categories 10, 1a, and 23 offered.

FREE and open to the public! Free dinner will be provided. See the schedule, speakers, and register online by August 14 at https://cals.cornell.edu/cornell-vegetable-variety-showcase-and-pathology-twilight-meeting

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Cornell Cooperative Extension
Cornell Vegetable Program

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