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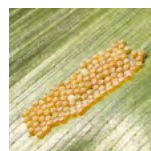
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Squash Vine Borer: Nobody Likes a Bore!

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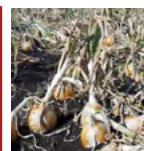
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Squash Vine Borer: Nobody Likes a Bore!

Abby Seaman, NYS IPM Program

Introduction

We often see squash getting a little wilted in the heat of the day, but if some of your plants don't recover overnight, you may have a squash vine borer population on your farm. Recognizing infestations early and responding with appropriate management strategies can prevent stealth population build-up and unexpected crop losses. Squash vine borer (*Melittia satyriniformis* syn. *Melittia cucurbitae*) is mainly a pest of squash (summer and winter), pumpkins, and gourds. The larval caterpillar stage burrows in the plant stem or crown, disrupting the transport of water and nutrients, which results in wilting. Squash vine borer is primarily a problem on smaller-acreage diversified farms; for unknown reasons, it is rarely a problem in large-acreage fields.

Varietal Preference

Most commercial varieties of cucurbits are one of three different species; *Cucurbita pepo*, which includes most summer squash, most pumpkin, and many long-keeping winter squash varieties; *C. moschata*, which includes butternut squash and some pumpkin varieties; and *C. maxima*, which includes Hubbard, Buttercup, Kabocha, and Jarrahdale types. The University of Illinois rated the attractiveness of 12 varieties of cucurbits and found that those that were *C. maxima* were most susceptible. *C. pepo* were intermediate, and *C. moschata* were least susceptible to damage from squash vine borer. Butternut squash are particularly tolerant of squash vine borer.

Identification and Biology

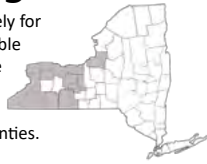
The adult squash vine borer is a distinctive clear-winged moth with a wingspan of 1–1 ½ inches. The top half of the body is black and the lower half is orange-red with a vertical line of black dots and feathery orange scales on the legs (Fig. 1). Unlike



Figure 1. An adult squash vine borer moth. Photo: Ansel Oomman, Bugwood.org. <https://www.insectimages.org/browse/detail.cfm?imgnum=5599171>

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The next issue of VegEdge will be produced on July 17, 2024.

Sweet Corn Pheromone Trap Network Report

Marion Zuefle, NYS IPM, 7/9/24

Statewide, 29 of the 35 sites reporting this week (see [trap catch table](#)). European corn borer (ECB)-E was trapped at 9 sites and ECB-Z was trapped at 4 sites. Corn earworm (CEW) was trapped at 15 sites, with 11 sites high enough to be on a 4, 5 or 6-day spray schedule (see [chart](#)). Fall armyworm (FAW) was caught at 4 sites and Western bean cutworm (WBC) was caught at 18 sites this week.

Western bean cutworm numbers are beginning to go up this week with peak flight expected late July into early August. It is important to begin scouting for egg masses even if cumulative trap catches have not reached 50, as egg masses have been found when cumulative trap catch was still in the single digits. 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 photo).

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 (see photo).



WBC egg mass shadow. Photo: T. Baute, OMAFRA



WBC egg mass. Photo: NYS IPM



WBC eggs become purple prior to hatch. Photo: Marlin E. Rice ●

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many moths, it is a daytime flyer and can sometimes be seen hovering in front of flowers feeding on nectar, or around cucurbit plants and vines where they lay their eggs.

Squash vine borers overwinter as mature larvae or pupae in the soil. Adults emerge in late June-July. Female squash vine borers lay small (1/25 inch) disk-shaped, reddish-brown eggs at the base of plants or vines. Eggs take 9–11 days to hatch, and larvae burrow into stems within hours of hatching. Larvae are wrinkled, whitish worms with a brown head capsule (Fig. 2).

Damage

The caterpillar larvae feed inside the plant stem, disrupting water and nutrient flow, and causing wilting. Damage can be especially serious in bush-type squash because the main stem can be destroyed. Vining-type cucurbits may have damage only in some runners. During dry seasons, the feeding can cause plants to die or seriously reduce yield. Check the base of wilting portions for the presence of insect frass (excrement) resembling sawdust emerging from the stem (Fig. 3). Slice open the stem to reveal the larva feeding inside.

Monitoring

Pheromone traps can be used to monitor the moth flight. Yellow and white bucket traps or heliothis-style traps are recommended for this insect. Traps and lures can be purchased from [Great Lakes IPM](#).

Base-50 degree–days (DD_{50}) can be used to predict adult squash vine borer emergence, which is estimated to be around the time when 1000 (DD_{50}) degree–days have accumulated. Find degree day accumulations for your area at the [Climate Smart Farming Growing Degree-Day Calculator](#). Another way to estimate when moths begin to fly is to look for chicory flowering. Chicory is a common roadside weed with distinctive blue flowers (Fig. 4).

Management

Cultural control: Reduce overwintering populations by disking in infested summer squash plantings as soon as harvest is complete. Tillage after longer-season cucurbits will disrupt larvae and pupae in the soil.

Chemical control: Research has shown that three weekly insecticide applications starting when the moth flight begins can provide good control of squash vine borer. Applications need to be directed at the stem and crown of the plants – dense canopies can make this challenging. There are several conventional insecticide options available. The most effective options for organic production include Bt aizawai (e.g. XenTari, Agree) and spinosad (Entrust).

Perimeter trap cropping: If your main crop is a less-preferred variety, you can use the difference in varietal susceptibility to attract the bulk of egg-laying onto a more attractive crop planted around the perimeter of the field. Research at the University of Connecticut has shown squash vine borer reductions of 88% in main crops of zucchini or summer squash when a perimeter trap crop of Blue Hubbard squash is used. The trap crop can be either treated with an effective insecticide to prevent borer infestation, or destroyed after the peak egg-laying period is over to kill borers in the trap crop. For more information on perimeter trap cropping, see: [Perimeter Trap Cropping for Yellow and Green Summer Squash](#). ●



Figure 2. A squash vine borer caterpillar. Note the dark head, deeply segmented body, and pile of frass coming out of the stem at right. Photo: Abby Seaman, NYS IPM



Figure 3. Squash Vine Borer frass accumulates at the base of a squash stem, pushed out of the entrance hole made by the squash vine borer larva. Photo: Abby Seaman, NYS IPM



Figure 4. Chicory in bloom signals the approximate start of the squash vine borer flight. Photo: Abby Seaman, NYS IPM

CROP Insights

Observations from the Field and Research-Based Recommendations

GENERAL

The storm on Wednesday is just the kind of weather system that can carry diseases and migrating insect pests up from regions further south. Combined with the heavy rain, there is elevated risk of new disease and pest problems developing over the coming week. Keep a close eye on your fields. Consider making a coverage spray of a protectant fungicide after the storm. Remember that most copper formulations only hold up to about 1" of rainfall before they wash off. – EB

BEETS

Fresh market beets are being harvested. The start of processing beet harvest is predicted to begin next week. Leaves of beets in some fields are showing tiny red spots or larger red blotches. These may be due to heat stress or wind blowing soil particles onto the leaves. I have not observed *Cercospora* leaf spot (CLS) to date, however, now is the time to proactively manage CLS on the farm. Beet plantings with closed, dense canopies are at highest risk because they retain moisture within the canopy. Such fields should be scouted weekly. An iOS app called "Sampling by Cornell" is available for iPhone and iPad users to assist with scouting for CLS. **Fungicide applications are generally only warranted if disease is present in the field, there is high risk based on the weather conditions, and the field has a significant time until harvest** by top-pulling machines or the beets are being sold with the tops on (bunching beets). The CLS decision support system (CLS DSS), which is available for free at <https://newa.cornell.edu/beet-cercospora-leaf-spot> calculates the risk of infection based on temperature and relative humidity. Please see the CLS DSS support manual online for further information or contact me. – JK

CARROTS

Leafhopper management is important through the summer because these insects can transmit aster yellows. See the 2024 Cornell Vegetable Guidelines for management options. – JK

COLE CROPS

Saw downy mildew and black rot last week. Yes, brassica downy mildew in July. If you have brassica downy mildew right now, too, know that it doesn't enjoy hot weather and a single treatment + typical July weather should knock it out. – EB

CUCUMBERS

Downy mildew is spreading (Fig.1)! Confirmed by the Cornell Vegetable Program in Seneca County on July 9. Counties between Seneca and Allegany likely have the disease as well, even if not confirmed yet. Materials that treat oomycetes are what you need. See the Cornell Veg Production Guidelines for a complete list. These same materials often (but not always) are labelled for other oomycete diseases like late blight, phytophthora blight (P.cap), pythium, and downy mildew in other crops. – JR



Figure 1. Look for rectangular tan lesions amid the green background of a cucumber leaf. Time to consider Downy Mildew specific fungicides. Photo: J. Reid, Cornell Vegetable Program

DRY BEANS

Japanese beetles and Mexican bean beetles have been seen feeding in dry beans this week. If left untreated, Mexican bean beetle can cause severe defoliation to dry beans. Earlier planted fields are starting to enter bloom stage, 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. – ML

GARLIC

Lots of diseased foliage this year. This could cause leaves to die back prematurely and make estimating maturity difficult. See Garlic Harvest and Post-Harvest Considerations from [6/5/24 VegEdge](#) to learn how to check bulb.

ONIONS

Most of the direct seeded crops have 7-9 leaves and are starting to bulb. Double applications of Movento are on. Several fields have gotten at least 1 week and some 2 weeks with the ride with the momentum of Movento. This makes fungicides applications simple, because growers can use Bravo 3 pt +/- mancozeb or FRAC P07 (Rampart, Reveille, etc.) for BLB

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halo lesions, BLB necrotic spots, some SLB, prevention of leaf dieback and downy mildew protection. Earliest planted early transplants have 2-3 bulbs and are 90% lodged and will be harvested within the next week. Stemphylium leaf blight (SLB) was calm with first detections and occurring as a secondary pathogen in most fields. BLB necrotic spots have showed up in some fields and remain at very low levels. BLB halos are steady or decreasing. The most active/primary SLB that we saw this week was in transplants that had 2 inch bulb, just before tipurn is about to start. The middle part of the fungicide spray season tends to be the most complicated for making fungicide spray decisions for SLB – **see article on page 7 for 2023 research highlights and implications for fungicide recommendations in 2024**. Also, 2024 Cornell Muck Onion Fungicide Cheat Sheet is now available online: https://rvpadmin.cce.cornell.edu/uploads/doc_1139.pdf. **Onion thrips are going absolutely bonkers in parts of Elba**, it is highly suspected that an influx from hay or wheat has descended upon the Elba muck. Hopefully, Wednesday rain will drown some of them. Thrips are also expected to spill out to surrounding onion fields in droves when the early transplants are harvested. Growers will be checking their numbers on Thursday after the rain and after the adjacent onions are harvested to determine which insecticide will need to be sprayed. **Exirel 20.5 fl oz is the biggest gun we've got** with proven ability to take down 10-20 thrips/leaf to 2/leaf with 2 shots 7 days apart. However, if Exirel has already been sprayed, growers will have to pick something else such as Radiant 10 fl oz + Warriri 1.92 fl oz. With bulbing has come first detections of **Iris yellow spot virus (IYSV)** and **foliar symptoms of bacterial bulb rot**.

Check out the new 4 minute diagnostic video on identifying foliar symptoms of bacterial disease and distinguishing them from look-alikes that we (Hoepfing & Caldwell) made for the Stop the Rot project. The [video](#) is available on the [Cornell Vegetable Program YouTube Channel](#). – CH



Fresh Market Onions – Thrips abound. Look between the young leaves deep in the growing point and on folds in older foliage. The rain may knock them back for a short period but don't take that as a sure thing– go check! Thrips open wounds and help spread rot plus directly reduce photosynthate production – all undesirable things. Fresh market growers can treat with Radiant or Entrust if they do not have the insecticides on hand that Christy discusses for muck production. I know Warrior and generics and other pyrethroids (incl. Pyganic) may list thrips on the label, but resistance is widespread and I don't see many fresh market growers get good knockdown with those products.

Cutting black plastic off bulbs as they size can help reduce sour skin rot losses in large, fresh market production of sweets (and storage to a lesser degree). The onions don't like the added heat and moisture trapped around the bulbs. Problems are much less with reflective silver and white mulch. – EB

MELONS

Cantaloupes also can get downy mildew and we're entering Alternaria season. Melons are less susceptible to downy than cukes and symptoms are more subtle than the showy check-boards we see in cukes (Fig.2). This means that while you may not see symptoms right away, they can easily sneak past you. You may well need to tank mix an oomycete effective and an Alternaria effective fungicide to adequately maintain foliar health. Very few products will effectively control both diseases.

Manganese deficiency has presented itself this week in Finger Lake fields of melons. Although all crops can become manganese deficient, cantaloupes in particular are susceptible. The symptoms include bright yellow large margins on otherwise green leaves (Fig. 3). Cornell recommends very low rates of soil applied manganese (Mn) fertilizer in cases of deficiency (3-5lbs/ac), however, crop deficiency does not indicate soil deficiency. It is common for cantaloupes to become temporarily deficient in Mn during periods of hot temperatures and saturated soils. Many areas had waterlogged soils following isolated downpours last week, and word on the street is that it is warm out there. In these instances, it is advised to wait out the deficiency instead of applying Mn, as under certain circumstances injected Mn can further tie-up soil stocks. – JR



Figure 2. Downy mildew symptoms on cantaloupe aren't quite as rectangular as they are on cucumber but are irregular tan spots surrounded by yellows. Photo: J. Reid, CVP



Figure 3. Manganese deficiency symptoms include bright yellow large margins on otherwise green leaves. Photo: J. Reid, CVP

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PEAS

Powdery mildew is finishing off many of the remaining fresh market pea plantings. – EB

Processors report that the crop has been maturing quickly because of the hot weather. Yields have been consistently good overall. No major problems reported for the processing crop this year. – JK

PEPPERS

Most fields are doing well. Keep an eye out for broad mite damage, which can be twisting, distortion and scarring on the newest growth. I have seen more than the normal share of undersized plants going reproductive. It is important to grow a frame and a solid canopy of leaves before allowing the peppers to fruit. Overly small plants that fruit early won't reach their full size potential and often can't keep fruit out of the sun, so all that early fruit is wasted and the plants have little capacity to produce more.

POTATOES

Colorado potato beetles and potato leaf hoppers are active in potato fields. Be sure to monitor populations and treat if thresholds are reached. **Late blight has been found in potato (US-23, sensitive to Ridomil) and tomato (genotype not yet known) in Ontario Canada this week.** The recent storm could easily have picked up any sporulating late blight in southwestern Ontario and carried the infectious spores to western NY. Be prepared and scout diligently. Pay special attention to areas with less airflow or less water drainage. It is recommended for growers to use protective fungicide sprays. If you suspect you have late blight, please reach out to a CVP specialist. – ML & EB

SNAP BEANS

Continue scouting for potato leaf hoppers (see last week's VegEdge). Japanese beetles and Mexican bean beetles can defoliate fresh market beans. These beetles are not a major problem for processing snap beans but could be for organic production. Early fresh market beans are being harvested, and processing bean harvest is likely to start within the next week. – JK

SQUASH

Heat stress on summer squash plants having an effect. Leaf scorching, extreme wilting, and winds damaging leaves. All of these have contributed to some plantings being set back having leaf canopies reduced exposing flowers to full sun where poor pollination is occurring. Poor fruit set or small disfiguring of fruit is occurring in high numbers. – RH

Hot and wet favors phytophthora, so this is a good week to treat known problem fields with an oomycete specific fungicide. A couple cases of bacterial leaf spot beginning to appear.

Squash vine borer continues to fly (see cover article). Plenty of squash bug activity and we're beginning to see second generation striped cucumber beetles emerging from the soil, where they've been happily munching on roots. If you haven't already, rogue out any cucumbers, etc showing bacterial wilt to reduce further spread in your field by this generation of cuke beetles.

Remember that over reliance on pyrethroids tends to flare up aphid and spidermite problems. The pyrethroids kill off the beneficials that normally keep those pests in check. Flaring up spider mites and aphids requires more spraying of different materials which gets expensive. Avoid this problem by spraying only as indicated by scouting and by rotating chemical families when possible. For squash bugs you are targeting the newly hatched nymphs. Large nymphs and adults are hard to kill, little nymphs much easier.

SWEET CORN

Ears are here! And so is western bean cutworm (booo!) We're just starting the flight, expect pressure to peak in a couple weeks. The adults like to lay their eggs on the upper leaves, on the topside of the leaf in the half closer to the stem. Very scouting friendly, look for the shadows created by the egg masses. They turn purple within 24 hours of hatching, so flag any you find and wait for them to turn colors to best time you spray.

TOMATOES

The recent storm could easily have picked up any sporulating late blight in southwestern Ontario and carried the infectious spores to western NY. Be prepared and scout diligently. Pay special attention to areas with less airflow or less water drainage. Please contact CVP if you think you might have late blight.

Seeing septoria and bacterial speck/spot active in field plantings. Expect much more of these issues following heavy rain. Trimming the lower leaves below the first fruit and using living or clean (weed-free) straw between rows further reduces soil splashing and reduces septoria, early blight, and bacterial diseases. Botrytis and spider mites commonly explode in tunnels this time of year.

I've not seen bacterial canker...yet. It is out there and farms with a history will be at highest risk. Unlike speck and spot, bacterial canker is systemic and moves through the veins. Early symptoms include wilting at mid-day despite having adequate water, reduced vigor, and scorching along leaf edges.

Remember that all bacterial diseases of tomato are easily spread around by workers and equipment. Work infected patches last and stay out of them until the foliage is dry. Copper is the most effective treatment for all bacterial concerns and can be mixed with mancozeb (restricted use material) to add broad-spectrum fungal protection and slightly enhance the copper's activity. Be sure to use all PPE listed on the label when working with mancozeb. – EB

WATERMELONS

Historically we start to see gummy stem blight in mid-July. You can get ahead of that now by at least putting a protectant out on your field. Chlorothalonil is best but the efficacy should be weighed against the risk to pollinators. Bees are attracted to chlorothalonil and take it home to the brood. It is good to select something else if you can during peak bloom, or at least spray in the evenings. ManKocide is the next best protectant for gummy stem blight, followed by copper alone. Copper struggles against gummy, so organic growers will really need to lean into good airflow (kill the weeds) and regular coverage through July. Many group 3 and 7 fungicides have activity against gummy stem blight. Switch (generic is Alterity) is considered the best material and contains group 9 + 12. Make sure you're rotating chemical families and watch out for active ingredient overlap across products – many contain difenoconazole and wouldn't be good rotational partners. ●

Stemphylium Leaf Blight (SLB) of Onion 2023 Research Highlights and Implications for Management in 2024: Part I – The FRAC 3 Situation

Christy Hoepfing, CCE Cornell Vegetable Program, and Frank Hay, Dept. of Plant Pathology and Plant-Microbe Biology, 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 II of this article which will include FRAC M5, 2, 7, 9, 12, 19 and P07 will follow in next week's VegEdge.**
- **An article on Botrytis leaf blight necrotic spots** will be in a following issue of VegEdge.
- **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

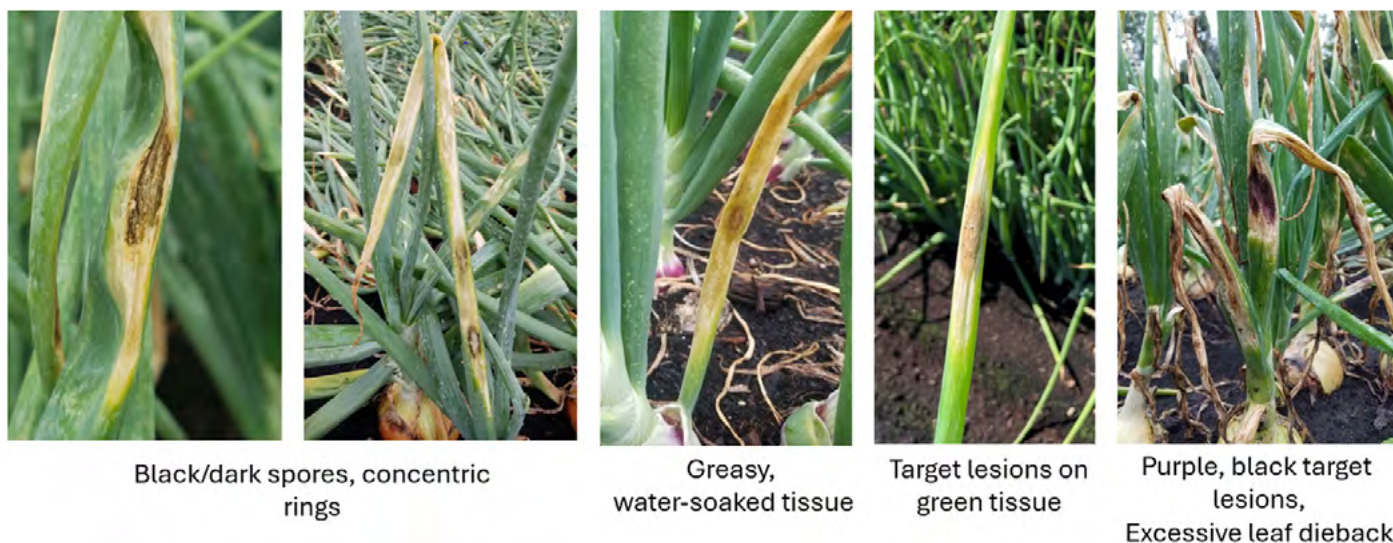


Figure 1. Primary Stemphylium leaf blight (SLB). When SLB behaves like a primary pathogen, the disease is actively infecting new leaves, including green leaves, and exacerbating leaf dieback. It is characterized by dark spores in necrotic leaf tissue and on target spots, greasy, water-soaked target spots, target spots of any color on green tissue, purple target lesions, and excessive leaf dieback*. It is not uncommon for SLB to behave as a secondary pathogen. This means that it is casually invading necrotic leaf tissue of onion perfectly content with no intentions of invading healthy tissue or exacerbating leaf dieback. It is normal to see SLB invading the necrotic leaf tip tissue and necrotic outer leaf tissue that commonly forms during bulbing. SLB also commonly invades necrotic leaf tissue from other causes such as herbicide or other phytotoxic tank mixes, IYSV lesions and onion leaves collapsing from bacterial disease. We do not count secondary SLB in our fungicide trial evaluations, only the primary form of the disease.

*Not all excessive leaf dieback is caused by SLB. Excessive leaf dieback can be caused by anything that stresses an onion plant including onion thrips feeding, pink root, Fusarium basal rot, nutrient deficiencies/imbances and saturated soil conditions, to name a few. *Photos: C. Hoepfing and C. Caldwell, Cornell*

Stemphylium leaf blight (SLB) is a potentially devastating foliar disease of muck-grown onions in New York.

- When uncontrolled it causes severe leaf dieback that reduces bulb size, yield and bulb quality by as much as 33-40%.
- Symptoms include tan to black sporulation on necrotic leaf tissue and tan, black and purple target spots that occur on both necrotic and green leaf tissue.
- **Target spots most commonly first appear when bulbing begins and can usually be detected in onion fields when the plants have 0.5 to 1" bulbs.**
- SLB pressure generally builds through the month of July and remains strong through August. **It is most critical to prevent excessive leaf dieback through August to ensure that onion plants lodge properly instead of "dying standing up" so as not to take a hit to yield.**
- For the purpose of evaluating fungicide performance and making management decisions, **we emphasize the primary form of SLB (Fig. 1).**
- **Note that SLB has developed resistance of varying degrees to fungicides that belong to FRAC groups 2, 3, 7, 9 and 11 in muck onion production regions in New York.** Obviously, this makes managing this disease with fungicides very challenging.

Summary of Fungicide Recommendations for SLB in 2024

- **Viathon (FRAC 3c + P07) + Tilt (FRAC 3a) remains the best treatment.**
 - It is very likely that it is the 3a + P07 that is doing the majority of the work in this combination as we rarely saw a significant difference between 3c + P07 (Viathon) and P07 (Rampart) alone.
 - Fungicide sensitivity testing has indicated that ~67% of the SLB isolates are highly insensitive to 3c and uncontrollable with 3c in Viathon and Viathon + Tilt. Alternatively, up to 60% of the SLB isolates are probably being controlled with 3a in Tilt and Viathon + Tilt. It appears that stacking double FRAC 3 products 3a + 3c in a tank mix does not pose any higher risk of selecting for highly resistant isolates than single FRAC 3c or 3a product.
 - You are welcome to experiment with 3a + P07 Tilt + Rampart/Reveille as the best treatment for SLB.
- **Miravis Prime 11.4 fl oz + Oso 10 fl oz/Rovral 1.5 pt + FRAC P07 is the second-best treatment.**
 - 3-way combos with FRAC 7 premixes (Miravis Prime/Luna Tranquility) + Rovral/Oso with FRAC P07 (e.g. Rampart or Reveille) +/-Bravo had a better track record for reducing primary SLB target spots in scouting fields in 2023 than 2-way combos with FRAC 7 premixes.
 - Oso may work better than Rovral in Elba, because Rovral did not perform well in the Elba fungicide trial.
 - Miravis Prime + Oso/Rovral resulted in greener foliage than Luna Tranquility + Rovral and would be a better fit with in the last 3-4 weeks of the spray program when keeping the onion foliage green is most critical.
- **Best treatments should be used during the last 3-4 weeks in the spray program** for a strong finish, giving the onions our best for preventing excessive leaf dieback, because this causes yield reduction and onions to die standing up. **Do not off the FRAC P07 throttle during this time and include P07 in each of these sprays.**
- **Moderately effective choices:**
 - **Bravo 3 pt + FRAC P07** worked well for SLB management (and BLB necrotic spots and BLB halos) in commercial onion fields in the onion scouting program when onions were green to the tip before disease pressure got high.
 - **Oso 10 fl oz + FRAC P07** did well in 2023 fungicide trials and is another option for the same timing.
 - **FRAC 12 Cannonball** has some activity on SLB sporulation of necrotic leaf tips and only a low-medium risk of fungicide resistance. It could be added to a tank mix for improved SLB control. if you want to rotate away from Rovral or Oso. For example, Luna Tranquility + Cannonball did fairly well in Wolcott fungicide trial.
- **Do NOT use more than 3 apps of FRAC 3 (+3) per season. Even if you had a brand new FRAC 3 with no resistance issues, do not use more than 2 apps per season.**
- **Do not to use more than 3 apps of Oso (FRAC 19).** Although the label allows for 6 maximum rate (13 fl oz) apps and it will always be used with another FRAC group to "guard" against fungicide resistance, it has a medium risk for fungicide resistance just like FRAC 3 and well, we know how that story is going!
- **Use as much Bravo as possible.** This has very good activity on BLB halo lesions and BLB necrotic spots and helps to prevent excessive leaf dieback when BLB necrotic spots exceed 50/leaf. In the scouting program Bravo appeared to help with primary SLB when used in a 3-way combo with FRAC 7 premix + Rovral/Oso and in Elba fungicide trial, Viathon + Tilt + Bravo was better than Viathon + Tilt due to improved control of BLB necrotic spots. Do not use Bravo when thrips control is the priority as it can reduce efficacy of the insecticide. FRAC M5 Bravo has a very low risk of fungicide resistance and the high rate may be used up to 6 times in a spray season.
- **Note, that FRAC 3s, P07, 12 and 19 have no activity on BLB halo lesions.** In fact, we sometimes have higher BLB halo lesions counts with Viathon + Tilt than the untreated. If you need something to control BLB halo lesions, Omega is excellent and Bravo and Merivon are very good.
- **Apply fungicides for downy mildew prevention.** Once SLB chases DM, there is nothing to do to stop a DM-SLB complex when weather conditions are favorable. FRAC M3, P07, 29 and 11 may be used to protect against DM. Once DM is detected and disease risk is high, Ridomil and/or Orodonis products should be used.

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2023 SLB Research Projects

2 on-farm small-plot trials:

- Both in variety Hamilton (118 days), one in Elba and the other in Wolcott.
- Sprays began after the first detections of SLB and continued weekly for 7-8 weeks.
- SLB pressure was moderate-to-severe.
- Generally, there were no significant differences among treatments for SLB target spots due to fungicide resistance and higher disease pressure. Fungicide performance was evaluated mostly on primary SLB sporulation of necrotic leaf tissue and plant health parameters.

Fungicide sensitivity testing:

- Performed on select treatments after 7th spray in the Elba fungicide trial to evaluate how FRAC 3c vs. 3c + 3a vs. (3c + 3a) x2 affected selection of insensitive and highly insensitive SLB isolates.

Field performance of fungicides on SLB:

- Scouting data and fungicide summaries were charted for each of the 19 commercial muck onion fields in the onion scouting program to glean information on field performance of fungicides.

Not all FRAC 3 a.i.s are the same

Novel (never used/labeled in onion) FRAC 3g a.i. prothioconazole, which was applied as Proline 5.7 fl oz/A was the best treatment in both trials:

- SLB sporulation of necrotic leaf tissue was reduced by 81-89% (from 75%/87.5% in nontreated to 8.3%/16.7% in Wolcott/Elba trials).
- Increased green foliage by 18-times (from 5%/4.3% in nontreated to 88.8%/77.5% in Wolcott/Elba trials).
- Reducing onions dying standing up by 97-99% (from 72%/82% in nontreated to 0.3%/2% in Wolcott/Elba trials).
- Increased yield by 53% (= 260 cwt/A) ue to 33.6% more jumbos compared to nontreated in Elba trial. Significantly higher yield than all other treatments.
- **SLB and BLB necrotic spots did not appear to be resistant to FRAC 3g.** This may be proof that the mechanism of fungicide resistance of SLB is not caused by a target site gene mutation, and that **cross-resistance does not occur uniformly among all FRAC 3 a.i.s.** There may be other FRAC 3 a.i.s that have complete activity on SLB.
- **Prothioconazole is not labeled in onion in the U.S.** We are looking into pursuing such a label with Bayer.
- **Two other novel (not used/labeled in onion) FRAC 3 a.i.s were trialed that had no or poor activity on SLB.**
 - FRAC 3e – flutriafol (applied as Topguard) and 3f – tetraconazole (applied as Domark) performed similarly to Inspire Super and Quadris Top, which were Poor-to-Fair or failed at reducing SLB sporulation of necrotic leaf tissue and keeping foliage green (all failed in Elba).
 - These results suggest that cross resistance among 3b, 3e, 3f and probably 3c (see FRAC 3c section) a.i.s is occurring.

Tilt (FRAC 3a) better than FRAC 3b (in Inspire Super/Quadris Top).

- **Tilt generally had Good/Moderate activity** on SLB sporulation of necrotic leaf tissue and preventing leaf dieback & dying standing up/keeping foliage green, which was either significantly or numerically better than Inspire Super and Quadris Top.
- **Inspire Super and Quadris Top performed better in the Wolcott trial**, where they reduced primary SLB sporulation of necrotic leaf tissue by 81% and 57%, respectively and had ~ 4-times more green foliage than the nontreated. In Elba, they reduced primary SLB sporulation of necrotic leaf tissue by 31% and 44% and were not different than the nontreated for green foliage.

FRAC 3a (Tilt) better than FRAC 3c (in Viathon).

- **Fungicide sensitivity testing of isolates** collected from the nontreated (= ambient SLB from Elba muck where no more than 2 apps of FRAC 3a + 3c were applied in 2022 and 2023) and compared to the Elba muck scouting field profile from 2022 indicated that **fungicide sensitivity to FRAC 3c shifted towards more insensitive (= resistant) isolates** ([Table 1](#), available online at CVP.CCE.CORNELL.EDU).
- Alternatively, there was **only a slight change in FRAC 3a fungicide sensitivity** from 2022 ambient Elba SLB and the nontreated in the 2023 fungicide trial, indicating that field performance in 2023 should be similar to 2022.
- Presumably, high rates or FRAC 3 + 3 tank mixes can control moderately insensitive SLB isolates and possibly even some insensitive SLB isolates, but such treatments would not be able to control highly insensitive isolates. **Currently, at least 67% of the SLB isolates are uncontrollable with 3c in Viathon or Viathon + Tilt in Elba, whereas ~60% of the SLB isolates are probably being controlled with 3a in Tilt and Viathon + Tilt.** Based on field trial data, it is suspected that the FRAC 3c situation is not as bad in Wolcott.

Viathon +Tilt best treatment, but FRAC 3a and P07 doing most of the work, not FRAC 3c.

- **Overall, Viathon + Tilt was either the best or second-best treatment for all SLB and plant health variables**, although not as good as it once was. In the 2024 fungicide cheat sheet, its relative performance was down-graded slightly from 2023 ratings.

- **Of 24 applications made in 18 commercial fields of the onion scouting program in 2023, Viathon 3 pt + Tilt 8 fl oz appeared to decrease (25% = 6 apps) or hold (25%) primary SLB as measured by % SLB targets on green tissue 50% of the time (= 12 applications).**
- In fungicide trials, there were no differences between FRAC P07 Rampart, FRAC 3c + P07 Viathon and FRAC 3a Tilt, except Tilt provided better control than Rampart of primary SLB sporulation on necrotic leaf tissue in Elba and Viathon had significantly greener foliage than Rampart and Tilt in Wolcott. **These results indicate that FRAC 3c does not have much or any activity on SLB or plant health.**
- **Fungicide sensitivity testing of SLB isolates collected after the 7th spray showed no difference between FRAC 3c Viathon and FRAC 3c + 3a Viathon + Tilt for either 3c or 3a, which indicated that stacking 3a + 3c in Viathon + Tilt was not any riskier for selecting for highly insensitive isolates (uncontrollable) than Viathon alone (Table 1).**
- **Since Viathon + Tilt is more effective in the field than Viathon, it should be safe to use two times per season without risking selection of highly insensitive SLB isolates.**
- Unfortunately, 66% of the SLB isolates (highly insensitive to 3c) will not be controlled by 3c in Viathon + Tilt (Table 1); rather 3a and P07 will be doing most of the work.

Increasing FRAC 3a + 3c rates did not significantly improve disease control

- Although FRAC (3a + 3c) x2 (or 4 x 3) was always the best or not significantly different than the best treatment for all SLB and plant health variables, it was never significantly different than Viathon + Tilt (3a + 3c) with P07 the same rate in both treatments, except for reducing total SLB spots in Wolcott. However, it had value in keeping onion foliage green, which had the most effect on yield in Elba.
- Fungicide sensitivity testing after 7 sprays of the fungicide trial in Elba revealed no difference between 3a + 3c (= 2 x 3) and (3a + 3c) x2 (= 4 x 3) for 3c, which means that **FRAC 3c has lost its utility for effective SLB control and that there is no way that the rate of FRAC 3c can be increased to achieve control of the high proportion of highly insensitive isolates (Table 1).**
- FRAC (3a + 3c) x2 selected for highly resistant isolates compared to Viathon + Tilt, which did not. **This result suggests that increasing rates or adding more than 2 FRAC 3s to a tank mix will select for highly resistant SLB isolates that will be uncontrollable and should not be done.**

==> Look forward to **Part II of this article in next week's VegEdge where we will share SLB research highlights for FRAC M5, 2, 7, 9, 12, 19, 29 and P07.** BLB necrotic spot research highlights also will also be coming soon. ●

Upcoming Events – See Cornell Vegetable Program events at CVP.CCE.CORNELL.EDU/EVENTS.PHP

WNY Vegetable Summer Field Walk (Orleans)

July 15, 2024 (Monday) | 6:00 pm - 8:00 pm

Lloyd Stauffer's farm, 12447 Roosevelt Hwy, Lyndonville, NY 14098

Meeting starts in the field. We will progress from crop to crop, learning hands-on pest, disease and weed ID and scouting techniques. IPM control tactics for both preventative and reactive management will be discussed in group dialogues. The group will return to the pack-house for research update presentations. 2.0 DEC credits requested.

FREE! Contact Elizabeth Buck at 585-406-3419 with questions.

Vegetable Pest and Cultural Management Field Meetings for Auction Growers

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. Details on each topic will focus on field observations at these farms. All meetings begin at 7:00 pm and last approximately 2 hours. 1.75 DEC credits in categories 10, 1a, 23, and 24.

ONTARIO - July 16, 2024 (Tuesday) | Daniel Nolt's farm, 3725 State Highway 245, Stanley, NY 14561

SENECA - July 24, 2024 (Wednesday) | Levi Esh's farm, 2033 Yerkes Rd, Romulus, NY 14541

Webinar: Managing Dry Bean Diseases in the Field

July 19, 2024 (Friday) | noon - 1:00 pm

In this webinar, learn from Dr. Sarah Pethybridge of Cornell AgriTech about common dry bean diseases to look out for, how to distinguish them from each other, and your options for management. The webinar will be informal and interactive. Both certified organic and conventional methods will be discussed. FREE event, but you must pre-register at <https://go.uvm.edu/beansforlunchwebinar> before the webinar date to receive the confirmation email with the webinar link.

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Upcoming Events

Lake Erie Region Vegetable Meeting

July 25, 2024 (Thursday) | 6:00 pm - 8:00 pm
Yerico Farms LLC, 3186 E Main St, Dunkirk, NY 14048

We'll take a look at sprayers, pepper anthracnose, and walk the fields discussing other crop production issues. 2.0 DEC credits in categories 1a, 10, and 23.

FREE! Contact Elizabeth Buck at 585-406-3419 with questions.

Tree Fruit and Small Fruit Twilight Meeting

July 25, 2024 (Thursday) | 6:30 pm - 8:30 pm
Simpelaar Fruit Farms, 6018 State Rt 3, Mexico, NY

Join specialists Anya Osatuke, Janet Van Zoeren, Robert Hadad, and Anna Wallis for a conversation about tree fruit and berry phenology, pest management, food safety and water quality. This meeting will examine seasonal changes in tree fruit and berry crops, demonstrate scouting techniques, and discuss integrative pest management solutions to maximize the health and productivity of berry and fruit plantings.

1.5 DEC credits available in categories 1a, 10, 22. This event is FREE, and no pre-registration is required. Pizza and refreshments provided by Valent. Questions? Contact aco56@cornell.edu

Niagara Region Vegetable Meeting

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

We'll start this meeting off at Root Down Farm to 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. We'll also cover industry updates and a review of late summer disease management in squash. 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

Bejo Seeds is pleased to welcome you once again to their 2024 Open Days in Geneva, NY! 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

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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.

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Cornell Cooperative Extension Cornell Vegetable Program

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