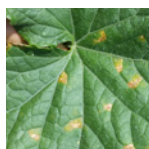




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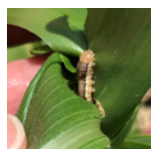
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Cucurbit Downy Mildew – Don't Let It Sneak Up on You

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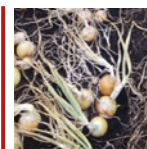
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Cucurbit Downy Mildew – Don't Let It Sneak Up on You

Robert Hadad, Cornell Cooperative Extension, Cornell Vegetable Program

Over the years, cucurbit downy mildew (CDM) has snuck up on us a number of times during the week of July 4th. CDM has been found in Georgia and S. Carolina in cucumber and cantaloupe. Michigan hasn't any confirmed disease field outbreaks Michigan has been finding spores in their trapping network over the last two weeks. Yesterday they found several plants with disease symptoms in the southwest corner of the state in a commercial field. Forecasts predict spread to the east and northeast of their state.

With the frequent pop up rain storms and winds out of the south and the west, it is a good idea to be ready to at least have protectant sprays in your tool box. Bravo Weather Stik, Champ Formula 2F, and ManKocide are protectants ahead of the disease. These can also be mixed with other mobile fungicides when the disease is close by.

Margaret McGrath, Cornell Plant Pathologist out on Long Island put out an informative chart last season that cross references disease management products for powdery mildew, CDM, and phytophthora blight in vine crops: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Cucurbit_Fungicide_List_2019-NY.pdf

Her recommendations is to grow cucumber varieties that show resistance.



Cucurbit downy mildew. Photo by Margaret McGrath, Cornell

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About VegEdge

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.

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This next issue of VegEdge newsletter will be produced on July 1, 2020.



RESISTANT VARIETIES

"Resistance was the main tool for cucumbers until a new strain of the pathogen developed. Since 2004, varieties with this resistance, which include most hybrids, have provided some suppression of the new pathogen strains present, but substantially less than the excellent suppression that was achieved against strains present before 2004. However, these resistant varieties are still considered a worthwhile component of an integrated program. Fortunately, new sources of resistance have been found and cucumber varieties with these new genes for resistance are starting to become available. In a cucumber variety evaluation conducted at LIHREC in 2017, DMR 401 exhibited the highest level of resistance. Bristol and Citadel (pickling type suitable for fresh market) were moderately resistant but were not significantly less severely affected than SV3462CS, SV4719CS, and Diamond-back. Marketmore 76 exhibited limited resistance while Speedway was not significantly less severely affected than Straight Eight, the susceptible check variety. DMR 401, Bristol and Citadel were also the highest yielding varieties. DMR 401 was developed by Cornell plant breeders. In evaluations conducted in 2016 and 2017 at University of Massachusetts, NY264, DMR 401 (both sold at <http://commonwealthseeds.com/>), and Bristol exhibited good resistance with NY264 and Bristol performing best under high disease pressure."



Berry Update, June 23

Esther Kibbe, Cornell Cooperative Extension, Harvest NY

STRAWBERRIES

Harvest is in full swing, with fruit ripening quickly. Reports are coming in of strong demand for picked and U-pick fruit and solid prices. Crowd control and social distancing has been a challenge on some farms. Fruit size is smaller than normal, though fields with irrigation are doing better. Late varieties seem to be sizing up better than the early berries. Fruit quality has generally been good, probably helped by dry weather. However, in some fields without irrigation, plants have become dry and stressed and the berries are small, almost shriveled. Most fields have some strawberries with sunscald (Fig. 1). This can look very similar to leather rot, but is the more likely primary issue under dry conditions. Tarnished plant bug and slug damage can be found in some fields (especially organic or low-spray). I haven't seen leafhopper damage yet, but there are reports of it around – be on the lookout for mottled and misshapen leaves. With SWD catches increasing rapidly, strawberries are at risk.



Figure 1. Sunscald on strawberry.
Photo by Esther Kibbe, CCE Harvest NY



Figure 2. Phomopsis stem blight showing characteristic "shepherd's crook". *Photo by E. Kibbe, CCE Harvest NY*

CROP INSPECTION

"Scouting routinely for early symptoms is important to ensure targeted fungicides are applied starting at the onset of disease development. While the forecast program has accurately predicted many outbreaks, a forecasted risk of infection may not result in infection if conditions are not as favorable as predicted, and the forecast program can miss predicting a risk in particular when downy mildew is not reported. The program is predicting movement of the pathogen from known sources of the disease."

APPLY TARGETED FUNGICIDES WEEKLY

"Apply targeted fungicides weekly with protectant fungicides and alternate among available chemistry based on FRAC code to manage resistance development and avoid control failure if resistance occurs, and also to comply with label use restrictions on number of consecutive and total applications allowed. Start with protectant fungicides alone when there is a risk of downy mildew for the specific crop based on the forecasting program. Include targeted fungicides when downy mildew is present. Add new fungicides to the program when they become available; substitute new for older product if they are in the same FRAC group."

Meg's complete article and fungicide chart can be found on the new website (that should be live in the next couple of days) at www.vegetables.cornell.edu. If a hard copy is needed, please contact Robert Hadad at 585-739-4065.

BLUEBERRIES

Fruit is sizing up well in most areas, though some plantings without irrigation have been struggling. There are Phomopsis canker (Fig. 2) hits in some plantings. This is the time to put out blueberry maggot traps, particularly if you have had this pest in the past. Using a protein bait can attract them before they are ready to lay eggs, and gives an earlier warning to spray for them. Remember to apply any Nitrogen fertilizers before July 1.

BRAMBLES

Raspberries are starting to ripen in early varieties (and on stressed plants). They will be the most attractive host for SWD, and with early trap catches this season it will likely be a bigger problem in florican (summer) raspberries than usual. Don't forget that brambles need water too.

Armyworms are Poised to Eat Your Vegetable Crops

Julie Kikkert, Cornell Cooperative Extension, Cornell Vegetable Program

Large populations of Common “True” Armyworm feeding in fields of wheat and field corn were reported in portions of our region over the past week. The larvae are of various sizes and there could be an additional two weeks of feeding. There are also reports of armyworm “herds” traveling across roads in the region. When armyworms run out of food in wheat, cereal and grass fields, they will “march” into juicier crops, especially corn, and including vegetables. Armyworms feed at night, so check fields regularly for ragged holes chewed from the leaf margins, pellet-like frass on the leaves or ground, and hidden larvae under plants and surface residue.



Ragged holes and frass on the leaves are evidence of armyworm feeding on sweet corn. Photo by Julie Kikkert, CCE Cornell Vegetable Program



Peeling back the leaves of a damaged corn plant reveals an armyworm inside. Photo by Julie Kikkert, CCE Cornell Vegetable Program

MANAGEMENT

There are no management thresholds for vegetable crops. A 20- to 40-foot treated border around armyworm-infested wheat fields should prevent armyworms from entering other crops and minimizes the use of chemicals. CCE Field Crops Specialist Mike Stanyard recommends to always look at the back of the armyworm head for small white eggs. These are the eggs of a Tachinid fly which is the main biocontrol agent and enemy of the armyworm. If the majority of the larvae have eggs on them, do not spray unless there is immediate danger to the crop. The eggs will hatch and burrow into the larvae and kill them, however this may be a somewhat

slow process. If an insecticide treatment is needed for true armyworms, they are most effective if applied late in the day. Generally, true armyworms are easy to control with pyrethroid insecticides. It is important to detect problem areas early, while larvae are still small, because the large larvae do the most feeding and may quickly destroy whole stands.

Some useful information from *M. Montgomery, University of Illinois Extension* follows:

“During the day, true armyworms curl up on the ground, typically beneath residue if they can find it. Larvae come in a range of colors (gray-green to tan). When residue is pulled back, larvae at first remain fairly still (typically curled up but occasionally sprawled out). However, in a short period of time the half inch to 1-3/4 inch long larvae begin to crawl rapidly looking for someplace else to hide such as additional residue or a soil crack. The true armyworm has a dark head capsule with a wide “V-shaped” marking between the eyes plus an orange stripe running down either side of the body. While some of these features may be shared by “look-a-like” larvae, true armyworm larvae can always be distinguished from other larvae by a series of dark bands/ diagonal black smudge-like markings on the prolegs (false legs) of older larvae. True armyworm larvae typically overwinter in the southern United States, and moths migrate back north each spring. Once here and once they have mated, females deposit eggs on the lower portion of host plant material. That host plant material can include corn, wheat, beans, cabbage, carrots, onions, peas, peppers, radishes, sweat potatoes, etc. Larvae feed for over a month and remove notches or large sections of leaf tissue on either side of the main veins. Left unchecked, all leaf tissue may be removed and plants may become soiled by frass (a polite term for insect feces). A few generations of true armyworm occur each season.”

FOR MORE INFORMATION

Univ. Illinois Armyworm Fact Sheet: <http://ipm.illinois.edu/fieldcrops/insects/armyworm/>

Armyworm as a Pest of Field Corn: <http://ento.psu.edu/extension/factsheets/armyworm>

Univ. of Wisconsin: <https://ipcm.wisc.edu/blog/2020/06/armyworm-awareness/> ●

NY Sweet Corn Trap Network Report, 6/23/2020

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

Statewide, 29 sites reported this week with European corn borer (ECB)-E caught at four sites. ECB-Z was caught at seven sites. Nine sites reported corn earworm (CEW) with seven of those sites high enough to be on a 4, 5 or 6 day spray interval (see table at bottom of next page). The first fall armyworm (FAW) moths were caught this week at 3 sites while no Western bean cutworm (WBC) have been caught yet this season. No hybrid ECB moths were caught at any of the 5 sites with traps.

Based on the accumulated degree days (base 86/50), most sites are in the first generation treatment period for the bivoltine ECB (see table on next page). Bivoltine means that the moth has two generations per season while univoltine moths have only one generation per season. We have both the bivoltine and univoltine ECB moths present in NY.

continued on next page

European corn borer (bivoltine) development estimated using a modified base 50F degree day calculation

Development Stage	Accumulated Degree Days
First Generation	
First spring moths	374
First eggs	450
Peak spring moths	631
First generation treatment period	800-1000
Second Generation	
First summer moths	1400
First eggs	1450
First egg hatch	1550
Peak summer moths	1733
Second generation treatment period	1550-2100

Below is the predicted percent emergence for the univoltine ECB based on a modified base 50F degree day model. Based on the model, we are just now beginning to enter the first emergence of the univoltine ECB and are still below 10% emergence for most of the sites.

Degree-day model (modified base 50F) for predicting moth emergence of univoltine European corn borers

Proportion of Moths Emerged	Accumulated Degree Days
10%	911
25%	986
50%	1,078
75%	1,177
90%	1,274

Degree-day model for univoltine ECB from [North Dakota](#)

Even though ECB trap catch numbers remain low, feeding damage has been observed in the field. If corn is in the tassel emergence stage, scout the tassel area for any signs of larvae or frass. The threshold for tassel emergence stage corn is 15%. Eggs take approximately 100 base 50 degree days to hatch. Egg masses will change from white to cream to black as they age. When they appear black they are in the “black head” stage and will

most likely hatch within 24 hours. For growers using *Trichogramma ostrinae*, a beneficial wasp that will parasitize ECB eggs, releases should be made during the egg laying stage. For more information please refer to the fact sheet: [Using Trichogramma ostrinae to help manage European corn borer in sweet corn, peppers, and potatoes.](#)

WNY Pheromone Trap Catches: June 16, 2020

Location	ECB-E	ECB-Z	ECB Hybrid	CEW	FAW	WBC	DD to Date
Batavia (Genesee)	0	0	NA	0	0	0	787
Bellona (Yates)	NA	NA	NA	NA	NA	NA	802
Brockport (Monroe)	0	0	NA	0	0	0	821
Eden (Erie)	0	0	NA	10	1	0	816
Farmington (Ontario)	0	0	0	0	0	0	823
Geneva (Ontario)	0	0	NA	0	0	0	803
Hamlin (Monroe)	NA	NA	NA	NA	NA	NA	868
Kennedy (Chautauqua)	NA	NA	NA	NA	NA	NA	775
Leroy (Genesee)	0	9	NA	0	0	0	780
Lyndonville (Orleans)	5	0	0	0	0	0	744
Oswego (Oswego)	0	0	NA	0	0	0	631
Panama (Chautauqua)	0	0	NA	0	0	0	699
Penn Yan (Yates)	0	1	0	0	0	NA	772
Portville (Cattaraugus)	0	0	NA	7	3	0	720
Ransomville (Niagara)	0	0	NA	0	0	0	804
Seneca Castle (Ontario)	1	2	NA	1	0	0	770
Williamson (Wayne)	0	0	NA	0	0	0	685

ECB: European Corn Borer; CEW: Corn Earworm; FAW: Fall Armyworm; WBC: Western Bean Cutworm; NA: not available; DD: Degree Day (mod. base 50F) accumulation

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

Add one day to the recommended spray interval if daily maximum temperatures are less than 80F for the previous 2-3 days. ●

Managing Botrytis in High Tunnel Tomatoes

Elizabeth Buck, Cornell Cooperative Extension, Cornell Vegetable Program

Botrytis gray mold is an incredibly common disease in greenhouse and tunnel tomato production. Cultural controls can mitigate the disease and weather can exacerbate the amount of gray mold present. It isn't uncommon for gray mold pressure to reach levels that call for reactive chemical control. Many products are labeled for botrytis control in the field, but only a handful can be used in a greenhouse.

Scala is a group 9 fungicide that has excellent potential to control botrytis gray mold. As added benefits, Scala has a 1 day PHI and is a non-restricted use fungicide, applied at 7 fl oz/A. Unfortunately, botrytis gray mold can develop resistance to Scala, rendering it ineffective at controlling botrytis. Cross-resistance to other group 9 fungicides is not unusual in cases of botrytis that become resistant to Scala. Finding suitable Scala alternatives can be a challenge because of the cost of alternative products, spray license requirements, greenhouse application prohibitions (which applies to tunnels), cross-resistance to other chemistries, and specific label language regarding chemical rotation. Here are some Scala alternatives:

DECREE (GROUP 17)

Decree is very specifically a botrytis gray mold fungicide and it has a 0 day PHI. It is applied at 1.5 lb/A and must be rotated after 2 consecutive applications. Decree can be a very good rotational partner because it belongs to Group 17, which is uncommon among vegetable fungicides. Decree works best earlier in the infection cycle, before pressure builds to high levels. Decree is not a restricted use material.

LUNA SENSATION (GROUP 7 + 11) AND LUNA TRANQUILITY (GROUP 7 + 9)

Both fungicides share the same group 7 fungicide. Luna Sensation can be used in greenhouses, though Luna Tranquility is more specifically marketed for greenhouse applications. Importantly, the group 9 fungicide in Luna Tranquility is the exact same active ingredient that is in Scala. This means that in both Luna fungicides, the group 7 component will be the workhorse. Choosing Tranquility will continue to expose the botrytis to more of the ineffective chemistry, which is undesirable. Sensation also has some white mold suppression

New Onion Fungicide Recommendations for 2020

Part I: New Developments in Stemphylium Leaf Blight Fungicide Resistance

Christy Hoepting, Cornell Cooperative Extension, Cornell Vegetable Program

Stemphylium leaf blight (SLB) in onion is developing fungicide resistance at an alarming rate in New York. Again, this year, we have new fungicide recommendations based on field performance of fungicides in on-farm trials (3 in Elba, 1 in Sodus in 2019), and latest SLB fungicide sensitivity testing. Summaries of the most recent status of [SLB fungicide sensitivity and field performance of fungicides, including for Botrytis leaf blight \(BLB\)](#) for 2020 are available on the CCE Cornell Vegetable Program website in the onion section. Visit cvp.cce.cornell.edu

THE RULES FOR FUNGICIDE RESISTANCE MANAGEMENT FOR SLB IN ONION, 2020

- Start SLB fungicide program before disease symptoms start.
- Use **two** FRAC groups with activity on SLB in every spray.
- No more than **two** apps per FRAC before rotating to another FRAC group.
- Rotate active ingredients (a, b, c...) and sub-classes (1, 2, 3...) within each FRAC group.
 - Ideally, only 1-2 apps per fungicide
- No more than **three** apps per FRAC per season.
- Use high rates of FRAC 3. Use a minimum of Luna Tranquility **16 fl oz**.
- Do NOT use Merivon.
- Do not skip a week or extend the spray interval beyond 7 days. This could allow SLB population to rebound. During periods of low risk for SLB, use fungicides that work under low pressure, such as Bravo.

SLB DEVELOPING RESISTANCE TO FRAC 7 FUNGICIDES

FRAC 7(3) – boscalid in Endura and Pristine

These fungicides noticeably slipped in performance in Elba field trial in 2017. In 2018, 42% (Elba) and 78% (Oswego) of SLB isolates tested insensitive to boscalid. Of the SLB isolates collected in 2016, 94% were sensitive to fluopyram (FRAC 7(1) in Luna products) and fluxapyroxad (FRAC 7(2) in Merivon). These results suggested that cross-resistance among sub-classes of FRAC 7 had not occurred. Different numbers inside the bracket denote different sub-classes within FRAC group. This is not an official FRAC code, just my way of distinguishing the different sub-classes.

FRAC 7(2) – fluxapyroxad in Merivon

In both Elba and Sodus field trials in 2019, Merivon was not significantly different than the untreated check for SLB control (Fig. 1). Of the SLB isolates collected in 2018 from all regions, 41% were insensitive to Merivon. SLB isolates collected from Merivon treatments in 2019 Elba field trial showed an impressive 40% shift towards higher proportion of insensitive isolates between two and four applications of Merivon over the growing season. **It has been concluded that SLB has developed resistance to Merivon and it is no longer recommended.**

FRAC 7(1) – fluopyram in Luna products

In Elba field trial, Luna Tranquility 16 fl oz was the second-best treatment in the trial for control of SLB. The 16 fl oz rate was significantly better than the 12 fl oz and 8 fl oz rates, which were both “middle-of-the pack”. Previously, there were no significant differences among 16 fl oz, 12 fl oz and 8 fl oz rates of Luna Tranquility in side-by-side comparisons in six field trials. In 2019 Sodus field trial, there were no significant differences among these rates of Luna Tranquility, but all were “middle-of-the-pack”, instead of being the top-performing treatments. Frank Hay’s fungicide sensitivity testing of 2018 SLB isolates

collected from CVP region showed 37 to 50% were insensitive to fluopyram (FRAC 7 in Luna products). SLB isolates collected from 2019 fungicide trials in Elba and Sodus from Luna Tranquility 16 fl oz, 12 fl oz and 8 fl oz rates, and untreated control did detect a shift towards insensitive isolates in the 12 fl oz and 8 fl oz treatments in Elba, but not in Sodus. Another comparison between zero, six and nine applications of Luna Tranquility 16 fl oz showed a progressive shift towards higher proportion of SLB isolates that were insensitive to Luna Tranquility as number of applications increased. Even though Luna Tranquility 16 fl oz is still a top-performer in fungicide trials for reducing SLB colonization of leaf dieback tissue and target spot lesion counts, it has really slipped in green foliage/healthy looking plots (Fig. 1). None-the-less, **Luna Tranquility 16 fl oz and possibly Luna Experience 10 fl oz will continue to be an important fungicide treatment for SLB in 2020, but its use has to be highly guarded to halt further development of fungicide resistance.**

FRAC 7(4) – pydiflumetofen in Miravis Prime

This is a forth sub-class within FRAC 7 that is available for the first time in onion in New York for 2020 onion growing season. Unfortunately, in 2019 field trials, it was most often no different than the untreated for % SLB colonization of dieback tissue and SLB target lesion counts. However, it scored higher points for green foliage, which makes the results confusing. FRAC 7 category is complicated and cross-resistance among sub-classes is not well understood. There are different gene mutations that can occur in SLB that will confer fungicide resistance to FRAC 7 fungicides, and not all result in cross-resistance among sub-classes. With COVID-19 pandemic driving laboratory research to a grinding halt, Frank Hay was unable to determine which SLB gene(s) were mutated, so we do not know if we have cross-resistance among FRAC sub-classes.

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With such poor field performance of Miravis Prime as a brand new fungicide, I am hesitant to use it. On the one hand, having another FRAC 7 sub-class to work with could take some pressure of FRAC 3 group. On the other hand, it is quite pricey for its uncertain efficacy and relationship to resistant FRAC 7 sub-classes. It will be trialed again in 2020.

FRAC 3 FUNGICIDES ARE NOW THE BEST FOR SLB CONTROL

Development of fungicide resistance to FRAC 3 fungicides is a multi-step process that is observed as a slow erosion of fungicide efficacy over time. For difenaconazole (in Inspire Super and Quadris Top), there was a shift in insensitive SLB isolates from 0% to 2%, and in moderately insensitive isolates from 2% to 16% statewide between 2016 and 2018. But with > 80% of the SLB isolates still being sensitive to difenaconazole, field performance of Inspire Super in 2019 Elba and Sodus trials were as consistent as they had always been. The “writing is on the wall” however, **that SLB has the potential to develop fungicide resistance to this active ingredient, and it must not be overused.** In 2018, propiconazole (in Tilt) and tebuconazole (in Viathon) had 97% and 61% moderately insensitive SLB isolates, respectively. Whether this means that SLB are further along towards developing resistance to these fungicides, or simply not as potent as difenaconazole and require higher rates to be effective, will require continued testing of SLB isolates from 2019 and 2020 to see if there are shifts in fungicide sensitivity. In 2019 Elba and Sodus field trials, Tilt and Viathon appeared to demonstrate their “normal” level of activity “middle-of-the-pack”, although sometimes they were not as good as Inspire Super. **FRAC 3 is now the best fungicide class against SLB and must be used judiciously to preserve its useful longevity.**

SCALA + ROVRAL DEMONSTRATED GREAT FIELD PERFORMANCE ONLY IN ELBA

Last year, we announced that SLB had developed resistance to Scala and Rovral in Wayne, Oswego and Orange counties, according to Frank Hay’s fungicide sensitivity testing. Also, in 2018 Oswego field trial, Scala 18 fl oz, Rovral 1.5 pt and Scala 9 fl oz + Rovral 1 pt all resulted in poor control of both SLB and BLB. In 2019 Sodus trial, these treatments again performed poorly and were in the “significantly better than nothing, but not great” category. However, in Elba, Scala 18 fl oz was middle-of-the-pack, while Scala 9 fl oz + Rovral 1pt was one of the best treatments in the trial. Rovral alone was similar to Miravis Prime in that it scored high points for green foliage/healthy looking plots, but did not do well at reducing SLB colonization of die-back tissue or SLB target lesion counts.

QUADRI TOP 14 FL OZ + TILT 8 FL OZ (FRAC 3B + 3A) BEST FOR SLB

In both 2019 Elba and Sodus field trials, this was the best treatment for SLB control. Close runners up were Luna Tranquility 16 fl oz and Scala 9 fl oz + Rovral 1 pt in Elba and Inspire Super 20 fl oz in Sodus. In 2018 Oswego trial back when Luna Tranquility was on top of its game, Quadris Top 14 fl oz + Tilt 8 fl oz was as good as Luna Tranquility 16 fl oz. Applying two FRAC 3s (different active ingredients designated as 3a and 3b) in one application may be looked at in two ways: 1) A sneaky way of using a high rate, and preventing fungicide resistance. Or, 2) Risking development of resistance to both active ingredients at the

same time. For these reasons, **co-applying another FRAC group to Quadris Top 14 fl oz + Tilt 8 fl oz is recommended for resistance management. FRAC 3 + 3 should be reserved only for late high SLB pressure situations.**

CO-APPLICATION OF MULTIPLE FRAC GROUPS PER APP DELAYS FUNGICIDE RESISTANCE

In 2019, the treatments that floated to the top for best SLB control were those that included two FRAC groups. Even if one of the FRAC groups fell into the “significantly better than nothing but not great” category, it appeared to be giving the more effective product “something to lean on to stay stronger” against SLB fungicide resistance. For example, Luna Tranquility (FRAC 7(1) + 9a) held out better than Merivon (FRAC 7(2) only active against SLB), and Inspire Super (FRAC 3b + 9b) was more effective than Tilt (FRAC 3a) or Quadris Top (FRAC 3b only active against SLB). **In 2020, the new recommendation is to apply two FRAC groups for SLB in every spray.** The caveat to this is when Bravo is used, because it has multi-site mode of action (FRAC M5) and very low risk for fungicide resistance. It is also important to note that the other active ingredient in Miravis Prime is fludioxonil (FRAC 12), which when trialed alone (as Cannonball) in Elba 2019 trial, it completely failed to control SLB. Therefore, **it is recommended to co-apply Miravis Prime with another SLB fungicide.**

*Look forward to **Part II: Building a New Fungicide Resistance Management Program for Stemphylium Leaf Blight Piece-by-Piece** in next week’s issue of VegEdge.*

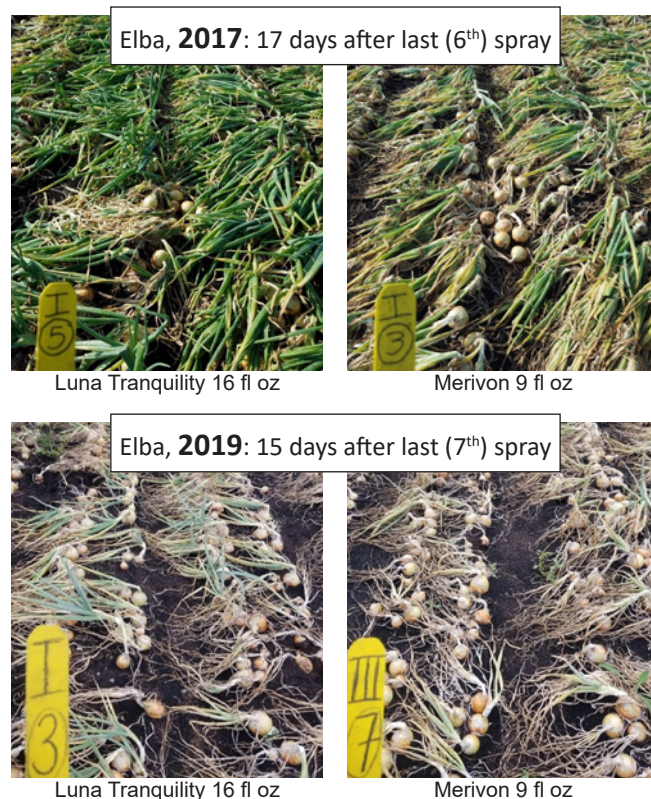


Figure 1. Two-year degradation of field performance of FRAC 7 fungicides, Luna Tranquility 16 fl oz and Merivon 9 fl oz for control of Stemphylium leaf blight in onion, due to the development of fungicide resistance. On-farm small-plot trials, Elba, NY. Photos by Christy Hoepting, CCE Cornell Vegetable Program ●

BEETS

Cutworms remain a potential threat to young seedlings. Continue to scout for leaf miner eggs and early tunneling in fresh market beets where tops will be sold. - JK

COLE CROPS

Seeing white mold developing in some plantings, working its way up from the base of the plant. Look for wilting plants. Early on in the disease cycle you'll see dark or blueish purple water soaked regions where the leaf meets the stem, sometimes accompanied by pale and potentially shrunken stems. The root system will be reasonably good (see photo). Cutting through the stem and core of the plant can reveal the fluffy white mold and the black sclerotia that will overwinter. Best to remove isolated infected plants from the field. For wider spread problems, Endura and Luna Sensation have white mold on the labels for use in cole crops. Curing infected plants is not a realistic goal, mitigation of new infections is a much more reasonable expectation. - EB

CUCURBITS

See important Downy Mildew article in this issue on the cover! - RH

Heavier soils that are high in pH and saturated from irrigation (or the nearly forgotten concept of rain) can produce temporary manganese deficiencies. This appears as a yellow margin on mid-age leaves (see photo). Generally, this will work itself out as the season goes on, although it may be time to review soil pH and irrigation schedules. Remember that nitrate nitrogen sources will raise root zone pH. - JR

Recent weather has been favorable for thrips and spidermite populations to develop in high tunnels and greenhouses, with some damaged fruit reaching local markets. Scout greenhouse cukes for these pests to prevent direct damage to the fruit or indirect damage (yield loss) due to feeding damage on the foliage. Thrips will be in flowers and on foliage, spidermites prefer foliage. Check the undersides of leaves near the veins when looking for both pests. - EB

DRY BEANS

Potato leaf hoppers (PLH) have moved from alfalfa into dry beans this week. In high numbers, PLH can lead to leaf mottling and curling, and eventually leaf death. Treatment should be considered if PLH are found at the following thresholds: 0.5 PLH/ plant at unifoliate stage, or 1 PLH/ trifoliate leaflet at later plant stages. - ML

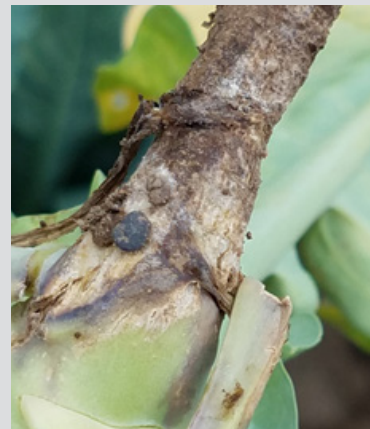
GARLIC

Many plantings have had scapes removed or will be scaped imminently. This is the time when bulbs will be sizing up. Providing adequate, consistent moisture is an easy way to promote good yield. - EB

LETTUCE AND GREENS

Most basil growers are rightfully concerned about Basil Downy Mildew, which is a season-ending disease once it begins. Symptoms include interveinal discoloration (yellow-to-bronze), with dark, fuzzy spores on the underside of the leaf. We don't have a confirmed report of Basil Downy Mildew yet, and these symptoms (minus the spores) can also be caused by other issues. Basil can also suffer from nutrient deficiencies linked to excess pH, such as manganese deficiency (see cucurbit section). Keep temperatures moderate, watch soil pH and consider a fertilizer program with micronutrient package (available in both conventional and organic forms). Note- Basil Downy Mildew is caused by a different mold than Cucurbit Downy Mildew. - JR

Tarnished plant bugs have been spotted in numerous locations. These fast moving, flying pests have a bronze, mottled back and a very characteristic yellow triangle in the center of their "shoulders". Tarnished plant bugs have an affinity for crops with large, pale midribs. They can be particularly damaging in green romaine and chard, with white veined chard plants hit hardest. Tarnished plant bug injects a toxin as it feeds, which opens a sunken wound that often heals poorly and serves as an entry point for systemic bacterial infections. Tarnished plant bugs also love pigweed, so fields with more pigweed may experience higher TPB pressure. - EB



The stem and base of a cabbage plant infected with white mold. The stem is shrunk and pale, with a dark, circular sclerotia at the base of a leaf. The leaf bases have dark, water soaked lesions. Photo: E. Buck



Bright yellow margins on an otherwise healthy leaf can indicate manganese deficiency. Photo: J. Reid



Basil becomes more susceptible to nutrient deficiencies as pH rises, the plants become pot-bound or the fertilizer package is incomplete. Symptoms are often confused with Downy Mildew. Photo: J. Reid

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ONIONS

Majority of direct seeded crop is in 4-5 leaf stage, while earliest transplants are bulbing. Conditions had been dry and growers were either irrigating or getting ready to irrigate. Monday and Tuesday's rain was quite variable across major onion growing regions with Elba getting a good drink and Wayne getting a few drops. Weed control projects are winding down as third apps of Prowl and final major post-emergent herbicide applications are being applied, and hand weeding crews are finishing up fields.

Despite the hot and dry weather of the past week, we generally did not see a jump in onion thrips pressure. Instead, thrips have just started to show up with most fields still well below the spray threshold of 0.6 to 1.0 thrips per leaf. However, there are some pockets where thrips pressure has exceeded the spray threshold, and some "influx" areas where thrips are moving into onion fields from external sources at a pretty good rate. Any fields that are at early bulb swell stage should get their first application of Movento this week, and plan on the second application next week at 0.5-1" bulb stage. Efficacy of Movento drops significantly when it is applied after this stage. In a season that is predicted to have good thrips pressure, you don't want to miss your opportunity to use this "big gun" insecticide. It is evident that Movento is working very well in the fields that have already been treated (as is expected).

Alternatively, the hot and dry weather has not been favorable for Botrytis leaf blight (BLB). In fields that have not yet been treated with fungicide, BLB halo lesion counts have only increased slightly and continue to remain below traditional spray threshold of 1.0 BLB halo per leaf. BLB halo lesion counts have dropped in fields that have been treated with Bravo or mancozeb 1 lb (start at first detection of BLB). Cooler and possibly wetter weather is expected to be more favorable for BLB and most fields will be getting their first, or continuing treatment for BLB. This is also the time of year when Cornell epidemiological studies (Hay 2017 & 2018) have shown that Stemphylium leaf blight (SLB) spores may be detected, so it is time to consider protective treatment for SLB at this time as well. **In light of SLB developing fungicide resistance to FRAC 7 fungicides, Luna Tranquility and Merivon in 2019, there have been many changes to the onion fungicide program – see Part I of 2-part article on page 6.** This year, applying fungicide before SLB symptoms develop is a new recommendation. Since current pressure and likely risk is currently low, a weaker fungicide against SLB, such as Bravo, hopefully will suffice. Managing SLB fungicide resistance is going to be challenging and will require strategic planning. - CH

PEAS

I'm very happy about (aka eagerly devouring) all the peas available at market. Depending on your market and labor scenario, you may consider grading shelling peas. Overly large, tough pods can contain large, dry, off-flavored overly mature peas. While these peas are just fine for canning and freezing, they can be a turn-off for those interested in fresh uses. Undersized shelling pea pods are great for eating fresh if you like to also eat the pod, but the undesirably small peas are useless to those interested in home preserving. In a direct retail market, some customer education about the differences between shelling vs. snap vs. sugar peas can help prevent misunderstandings and avoid dissatisfaction. - EB

PEPPERS

Transplants that are susceptible to root rot can have dying growing points (see photos). Tips may die back and become infected with Gray Mold. Roots will be discolored, brown or black and not sufficient to support the foliar growth. Phytothphora, Pythium and Rhizoctonia species can all cause these rots. Previcur Flex (propamocarb, Group 28) is labeled for field and greenhouse use with a 5 day PHI. Rootshield Granules is labeled for Pythium and Rhizoctonia control in Organic production. Prevention is better than any fungicide, conventional or organic. Allow root zones to dry out, keep greenhouses ventilated and sanitize trays. Our experience is that most transplants can overcome low levels of infection once planted in healthy fields soil. - JR

POTATOES

Colorado potato beetles (CPB) and Potato leaf hoppers (PLH) have been found in moderate numbers in potatoes this week. The first generation of CPB have started laying eggs in potato fields. The highest numbers of beetles are still being seen in field edges, though some beetles are making their ways to field centers. When scouting, check 30-50 plants per field, making sure to check plants along edges and within the field center. Insecticide application should be considered if any of the following thresholds are met: 25 adults/50 plants, 4 small larvae/plant, 1.5 large larvae/plant, or 10% defoliation. Potatoes are able to tolerate 20% defoliation by CPB before negative impacts on potato yield occur. PLH adults have moved from alfalfa into potatoes this week. In large numbers, PLH can cause hopper burn in potatoes, which can lead to yield reductions. Treatment should be considered for PLH if 1 adults is found per plant, or 15 nymphs per 50 leaflets are observed.

There is not much change in Blightcast severity values (SVs) this week. Five sites are over 18 SVs: Buffalo, Ceres, Niagara Falls, Versailles, and Wellsville. Three sites – Penn Yan, Fulton, and Rochester – are close to



Growing points on pepper transplants may die and become infected with Gray Mold when the roots are infected with Pythium, Rhizoctonia and/or Phytothphora. Photo: J. Reid



Roots infected with Pythium, Rhizoctonia and/or Phytothphora will be brown or black, and sparse. Photo: J. Reid

Late Blight Severity Values* 6/23/2020

Location	Total	Forecast 6/24 - 6/26	Location	Total	Forecast 6/24 - 6/26
Albion	1	1	Hammondsport	2	1
Arkport	8	3	Knowlesville	4	1
Baldwinsville	1	0	Lyndonville	4	0
Bergen	0	2	Medina	11	1
Buffalo	31	5	Niagara Falls	24	1
Burt	4	1	Penn Yan	15	2
Ceres	24	2	Rochester	14	1
Elba	1	2	Sodus	3	1
Fairville	1	1	Versailles	19	1
Farmington	8	1	Wellsville	37	4
Fulton	17	2	Williamson	3	1
Geneva	5	1			

* Severity value accumulations start 5/20/2020

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18 SVs. All locations are over 300 P-day values. An SV ≥ 18 indicates the threshold for late blight risk and associated need for a preventative fungicide application. A P-day value ≥ 300 indicates the threshold for early blight risk and associated need for a preventative fungicide application. Fungicide sprays should occur in fields with plants larger than six inches tall as soon as possible after either of these values have accumulated in your area. Weather data used to calculate SVs comes from weather stations located in each site, and can be accessed at <http://newa.cornell.edu/index.php?page=all-weather-data>. On a national level, no new late blight confirmations have been reported, and has still only been confirmed in FL and AL. No late blight has yet to be reported in NYS. - ML and JG

SNAP BEANS

With portions of our region receiving rain over the past few days, planting and emergence of beans should be more favorable in those areas. Potato leaf hoppers are present across the region and any snap bean fields that did not have a Cruiser insecticide seed treatment should be scouted regularly. In non-Cruiser treated fields, during pre-bloom, treat when more than one nymph per trifoliate leaf is found or when the number of adults exceeds 100 per 20 sweeps with a sweep net. On newly emerging beans, lower densities of leafhoppers than those mentioned above may be damaging. Cruiser-treated fields (a seed treatment) generally do not need a foliar treatment before bloom, but one may be needed after bloom if the pressure is high. Snap beans are sensitive to herbicides which may cause stunting or poor growth, and leaves may spot, yellow or curl. Possible causes are carry-over herbicides from previous crops, unusual weather during the current year affecting pre-emergence herbicides, or from post-emergent products used on the current field or from drift. These situations can be difficult to diagnose - JK

SWEET CORN

Early plantings are in green silk. European corn borer (ECB) damage has been observed this year and in recent years even when trap catches are quite low. Based on the degree days and scouting observations, it is a good idea to walk your late whorl to green silk stage fields looking for corn borer damage. While ECB can drill directly into the stalk at any height, they prefer to feed on the tassels and will drill through the whorl leaves to reach the unemerged tassels. In pre-tassel corn look for frass, window panes (holes that leave a thin membrane instead of cutting all the way through) cut into the leaves, and feeding damage where the hole in one leaf aligns with a hole in the next leaf that emerged (see photos). You can pluck the tassel and end of the whorl out of plants with feeding damage to peel layers back and count the number of ECB larvae – the plant will be fine. In flag and tassel corn, look in the tassel itself for broken tips or branches and frass. - EB

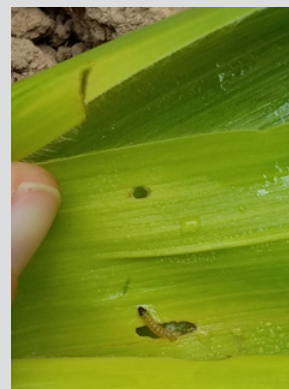
Cutworms are still a potential threat to young corn - JK

TOMATOES

The benefits of organic matter are clear during these weeks of low rainfall. Organic matter creates soil aggregates that allow plants to access moisture, develop finer root hairs and pull nutrients. Tomatoes grown in soils that experience excess tillage will be smaller, poorly colored and will not set or retain flowers. These soils will also crust over and crack, making it even less likely for the plants to take up moisture from the passing thundershowers. Don't till soils to the point of depriving crops of vital organic matter, particularly during a drought! -JR



Window panes in the outer whorl leaves leads to European Corn Borer holes cut through each successive leaf in the whorl as the larvae drill to the tassel. Frass is strewn on the leaves. Photo: E.Buck



Peeling back the layers on a plucked whorl reveals a European Corn Borer larvae eating its way to the tassel. Photo: E. Buck



No weeds, no problem? Not exactly. Excess tillage is depriving this crop of water and nutrients. Mulching provides longer benefits than perpetual tillage. Photo: J. Reid

continued from page 5 - Managing Botrytis in High Tunnel Tomatoes

capacity. PHI is 1 day on Tranquility and 3 days on Sensation. Sensation is applied at 7.6 fl oz /A, while Tranquility is applied at 11.2 fl oz/A and has specific language regarding application conditions requires post-application ventilation to reduce the risk of phytotoxicity. Both versions of Luna are restricted use materials.

SWITCH (GROUP 9 + 12)

Switch can be used in greenhouses (and tunnels) but must not be applied using a mister or fogger. Switch does contain a group 9 fungicide, so efficacy may be reduced when used in cases where botrytis has become tolerant to Scala due to potential cross-resistance. The group 12 fungicide in Switch does

carry activity against botrytis and would be the workhorse in such a scenario. Switch is a restricted use material applied at 11-14 oz/A with a 0 day PHI.

CONCLUSION

All of these alternatives to Scala require rotation to another chemistry, often one in different fungicide groups, after 2 consecutive applications. Even if Scala is providing satisfactory control, rotating with these materials is a strong practice for preventing the development of botrytis resistance on your farm. ●

Weather Charts

John Gibbons, CCE Cornell Vegetable Program

WEEKLY WEATHER SUMMARY: 6/16/20 - 6/22/2020

Location**	Rainfall (inch)		Temperature (°F)	
	Week	Month June	Max	Min
Albion	0.00	0.65	92	44
Arkport	1.06	1.12	86	45
Bergen	0.66	1.14	88	41
Brocton	0.52	0.93	87	51
Buffalo*	0.12	2.51	88	48
Burt	0.06	0.50	89	42
Ceres	1.47	2.31	88	41
Elba	0.15	0.91	90	44
Fairville	0.03	0.65	92	42
Farmington	0.16	0.73	89	43
Fulton*	0.27	0.73	92	45
Geneva	0.35	0.61	89	47
Hammondsport	0.20	0.67	89	44
Hanover	0.11	0.60	89	45
Lodi	0.54	1.02	88	48
Niagara Falls*	0.03	1.41	88	47
Penn Yan*	0.06	0.36	91	48
Rochester*	0.24	0.80	88	47
Sodus	0.00	0.27	88	41
South Bristol	0.26	0.71	88	47
Varick	0.75	1.16	88	49
Versailles	0.48	1.02	89	44
Williamson	0.09	0.53	87	43

ACCUMULATED GROWING DEGREE DAYS (AGDD)

BASE 50°F: APRIL 1 - JUNE 22, 2020

Location**	2020	2019	2018
Albion	639	527	787
Arkport	554	506	863
Bergen	626	524	733
Brocton	657	551	NA
Buffalo*	645	520	841
Burt	573	442	672
Ceres	542	580	712
Elba	613	493	759
Fairville	616	483	701
Farmington	642	507	735
Fulton*	639	479	714
Geneva	657	543	764
Hammondsport	629	519	733
Hanover	649	554	787
Lodi	677	577	799
Niagara Falls*	629	481	890
Penn Yan*	674	582	815
Rochester*	653	601	854
Sodus	602	476	690
South Bristol	629	519	752
Varick	705	601	810
Versailles	641	562	779
Williamson	594	447	672

*Airport stations

** For other locations: <http://newa.cornell.edu>

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