Cornell Cooperative Extension
Eastern NY Commercial Horticulture Program

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Vegetable News

2019 Heat Tolerant Lettuce Trial is Off and Running!

Crystal Stewart-Courtens and Natasha Field, CCE Eastern NY Commercial Horticulture

What a great summer to be conducting a heat tolerant lettuce trial! This is the second year of warm July temps, which are doing a great job of showing us which lettuces can handle the heat and which should be saved for spring and fall. We evaluated the first of the three plantings in mid-July, with three brave testers submitting their delicate taste-buds to 32 varieties of lettuce.

One of the most important factors is the number of plants bolting. Often this leads to bitter leaves and odd head shapes and sizes that are unmarketable. In this first planting, only a few varieties had bolted when we harvested and evaluated at 55 days from planting. However, just 6 days later, most of the varieties had bolted, leaving only a few able to be harvested. Those that were still marketable were: Salvius, Breen, Coastal Star, Cherokee, Nevada, Fusion, Dragoon, Truchas, Plato II, Jericho, and Sparx. Of those that held the best, Crystal really liked Cherokee, a purple romaine that held very well and was quite flavorful, and Fusion, a romaine cross which also held great and had very nice sweet flavor. We threw a few Boston varieties into the mix since they were sent along with the Romaines by our friends at Fedco and Johnny's, and we especially liked a variety called Kragener Somer. Full results including all the variety information and assessments will be available on our website when the final assessment is complete -stay tuned!

Fusion. Photo: Natasha Field

This year was cooler than last year during the growing period, with 12 days above 85 degrees and a slow increase to those high

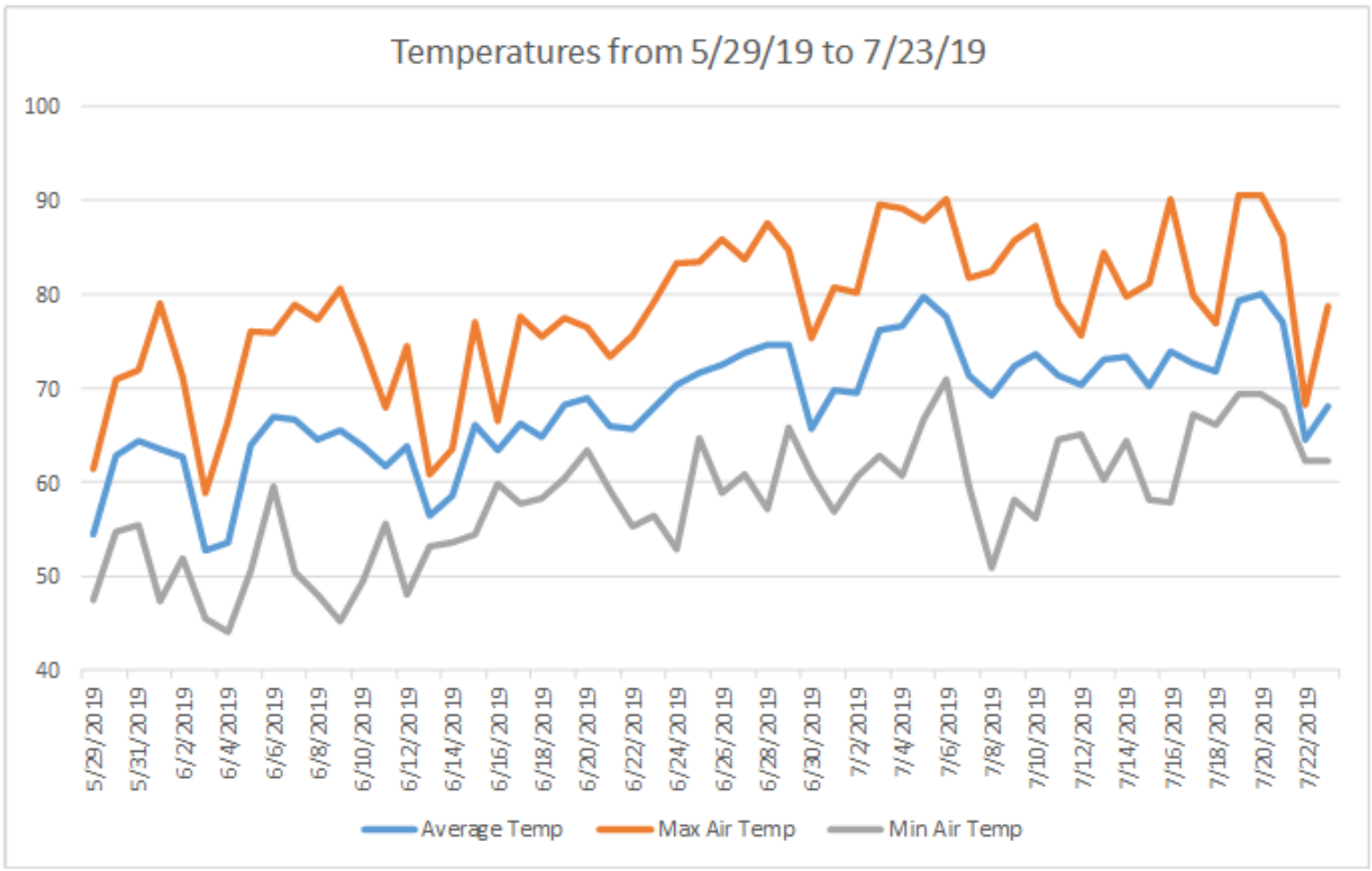
(Continued on page 2)

Table of Contents

(Continued from page 1)

temperatures as seen on the chart below. In 2018, the plantings that had the most sudden temperature swings from cool to hot had more plants bolting. 85 degrees is when lettuce will stop growing and experience greater heat stress, leading to bolting. Given that most varieties bolted quickly after we evaluated, keeping a close eye on your lettuce during extreme heat and humidity is extremely important to have heads that are still marketable.

Kragener Somer (left) and Cherokee (right). Photos: Natasha Field.



Timing Onion Sprout Inhibitor Application and Managing Black Mold

Ethan Grundberg, CCE Eastern NY Commercial Horticulture

Properly timing the application of Royal MH-30 (maleic hydrazide) sprout inhibitor is equal parts art and science. Here are some tips on how to make the most of your inhibitor:

- In general, sprout inhibitor should be sprayed once onions are fully mature (a good rule of thumb is that about 50% of onion tops should be down) on storage varieties that will be kept past November.
- Spraying inhibitor before bulbs are fully mature can result in loose and spongy bulbs that are unmarketable and more prone to mold and rot in storage.
- However, waiting too long is equally problematic. Onions should still have 5-8 green leaves per bulb in order to provide enough living tissue for the inhibitor to be absorbed and translocated to the bulb. If fewer than 5 leaves remain green or if plants have severe foliar disease pressure, there is a serious risk that the maleic hydrazide will not be taken up by the plant.
- Sprout inhibitor is not a silver bullet for guaranteeing good storage, either. If MH-30 is sprayed more than two weeks in advance of harvest and the bulbs are exposed to temperature extremes and rain in the field, bulbs may be triggered to break dormancy regardless of inhibitor application and uptake.
- Care must be taken to avoid applying inhibitors at temperatures above 85 degrees.
- Sprout inhibitor will not magically make a sweet onion store as well as a storage variety. Applications should only be made to varieties that are bred for long-term storage.

One final consideration on sprout inhibitor application timing: studies have repeatedly demonstrated that bulb onions size up significantly in the last month prior to 100% falling over. One study by Davis and Jones showed that yields per acre increased by 10,500 pounds/ acre in the time from 10% tops down to 100% tops down. However, other studies have shown that, in order to achieve maximum storage life, harvest should be timed around 40% lodge. So, depending upon your goals (maximum yield or maximum storage life) the timing of your inhibitor application and harvest may vary slightly.

Another question that often arises when discussing inhibitor application is whether to tank mix it with any adjuvants or fungicides. To answer the first question on adjuvants, the Royal MH-30 clearly states NOT to mix inhibitor with any adjuvants for onions grown east of the Rocky Mountains. The arid conditions of western grown onions at harvest often accelerates leaf dry down and requires the addition of a non-ionic surfactant to be added to facilitate absorption and translocation by the onions. However, the issue of whether to apply with a fungicide is more complicated. MH-30 is compatible with most fungicides, but it is recommended NOT to tank mix them. Growers also need to consider the mode of action of the fungicide being sprayed; inhibitor is formulated to penetrate the cuticle and move around the plant, so fungicides like copper and chlorothalonil that are effective on the leaf surface as protectants don't make sense to use with MH-30. Growers also need to assess the percentage of leaves that are still green, too. If leaves are mostly dry, they will not benefit from another foliar fungicide application.

What about late season fungicide applications for black mold (Aspergillus niger)? Multiple field experiments conducted both by Cornell and University of Georgia faculty have shown that there is no statistically significant improvement in black mold reduction from late season fungicide applications once leaves have dried. The same studies have, however, concluded that in-season foliar fungicide programs that are targeted to manage other foliar diseases (botrytis, stemphylium, and purple blotch) DO reduce the incidence of black mold in storage. Those interested in more detail on these trials should refer to the research done by Hunt Sanders et al in 2013-14 starting on page 37 at https://secure.caes.uga.edu/extension/publications/files/pdf/AP%20114_1.PDF.

Onions about 15% down and still not ready for inhibitor (left). Onions about 60% down, but still with adequate green foliage for a well-timed inhibitor application. Photos: Ethan Grundberg

So if late season fungicide applications don't reduce the presence of black mold on onions, what will?

- As already mentioned, keeping up with an effective foliar fungicide spray program in season
- Ensuring the onions are fully mature and dry at harvest, which can be facilitated by deeper undercutting early in the harvest process or lifting later in the season once sunburn is less of a concern
- Minimizing bruising and physical injury to onions during the harvest process
- Most importantly, focusing on creating the ideal post-harvest curing and storage conditions! Ideal curing conditions are 75°F-80°F at 70% humidity for about 2 weeks. Once curing is complete, both temperature and humidity should be gradually lowered to near 33°F and 50%, respectively. Since black mold thrives at temperatures above 60°F and at relative humidity of 80% and higher, hot and humid storage and curing conditions create a prime environment for it to grow.

Powdery Mildew: Time to Start Applying Controls

Charles Bornt, CCE Eastern NY Commercial Horticulture

Last week I started to see low levels of powdery mildew infest summer squash which is not unusual. I tend to use yellow squash as my "indicator" crop as we usually see it in these plants first because they are usually the earliest of the vine crops planted, but more so, they are the earliest to start setting fruit. Fruit set for me is the other indicator that I look for as this is the biggest stressor plants have and once fruiting starts, they devote most of their energy to setting, sizing and maturing fruit which is the prime time for diseases like Powdery mildew to get started. Couple that with the fact that PM likes it warm and dry we have the perfect recipe for the disease to ramp up.

I've also been in some early planted pumpkin and winter squash fields that are starting to size fruit as well so get out there and start scouting! Powdery mildew typically begins to develop on the older leaves so concentrate your efforts towards the crown of the plant where the oldest leaves are concentrated. Thresholds are 1 lesion out of 50 older leaves examined – when you scout you can't just look at the top – you need to pull away the leaves on top and get into the crown area where the first infections start. Too often I think we may start our treatments too late because we are not looking in this area.

Not much has changed in what we are recommending this year from last. Top choices of Powdery mildew targeted fungicides recommended this season are Vivando (FRAC U8), Proline or Procure or Rhyme (all FRAC 3), and Quintec (FRAC 13). These need to be used in alternation and tank-mix with a protectant fungicide.

Protectant fungicides include chlorothalonil (Bravo, Praiz etc.). Please remember that even though chlorothalonil has a 12 hour re-entry interval, there is an additional eye irritation provision that needs to be followed for the next 6.5 days. Entry is permitted only when the following safety measures are provided:

1) At least one container designed specifically for flushing eyes must be available in operating condition at the WPS required decontamination site intended for workers entering the treated area.

2) Workers must be informed in a manner they can understand that residues in the treated area may be highly irritating to their eyes and that they should take precautions, such as refraining from rubbing their eyes, to keep the residues out of their eyes.

3.) That if they do get residues in their eyes, they should immediately flush their eyes using the eyeflush container that is located at the decontamination site or using other readily available clean water

4.) And how to operate the eye flush container

Other protectants include sulfur – the most commercial available one is called Microthiol Disperss and has also proven to provide good protective properties when used as a mixing partner. The sulfur itself has the ability to volatilize and provide some control to the undersides of leaves as a result – but it needs to be used carefully. First, do not follow this in succession with something like JMS Stylet Oil or other oil products as injury may result - substitute something in between like chlorothalonil. Second, do not use sulfur **materials on cantaloupes or cucumbers** as they are much more sensitive to these products. Third, do not apply if temperature will exceed 90° F within the three days following spraying, due to the risk of crop injury. Fourth, spreader/stickers are not required or recommended so if you are tank mixing this material with a systemic material such as Proline that recommends an adjuvant; choose a different protectant other than sulfur.

I would also advise that if you decide to use sulfur products, apply them first thing in the morning or late in the evening to reduce any potential damage. Late evening would be preferred as most of the pollinators are either back at their hives or protected within the flowers.

Mancozeb (manzate, Roper etc.) should not be used as a protectant for powdery mildew as it does not provide any protection. However, mancozeb can be used if separate applications are required for Downy Mildew. Please note that the post-harvest interval on mancozeb is 5 days for most crops.

You will note that Torino is no longer being recommended as disease tolerance/resistance has been detected throughout the northeast region with significant failures in Long Island according to our Cornell Vegetable Pathologist Meg McGrath.

Powdery Mildew Schedule:

Week 1: Luna Experience (FRAC 7 & 3) at the highest rates plus protectant (chlorothalonil or sulfur)

Week 2: Quintec (FRAC 13) plus protectant (chlorothalonil or sulfur)

Week 3: Vivando (FRAC U6) plus protectant (chlorothalonil or sulfur)

Week 4: Procure or Proline or Rhyme (FRAC 3) at highest labeled rates plus protectant (chlorothalonil or sulfur)

Week 5: Quintec plus protectant (chlorothalonil or sulfur)

Week 6: Vivando plus protectant (chlorothalonil or sulfur)

Week 7: Procure or Proline or Rhyme (at highest labeled rate) plus protectant (chlorothalonil or sulfur)

Week 8: Vivando plus protectant (chlorothalonil or sulfur)

NONE of these materials will control Cucurbit Downy Mildew! When necessary add in specific materials for Cucurbit Downy Mildew starting with Orondis Ultra when models put us into high risk or found in the region.

Please note the Fungicide Resistance Action Committee group numbers after each product and try not to apply materials that contain single active ingredient modes of action or those products

(Continued from page 4)

with multiple active ingredient modes of action back to back!

Organic recommendations: See the products in red for rates and more information. Adequate coverage of foliage is also necessary for good control of Powdery Mildew. Start applications as soon as fruit start to set! The materials listed below really have no systemic activity and need to be applied weekly before Powdery mildew starts! Potassium bicarbonate products such as Kaligreen, Armicarb and Milstop are good options. Also, JMS Stylet oil can also be very effective at providing early season control of PM. Sulfur products that are labeled as fungicides, not dusts or foliar fertilizers would also be another option – but please be sure to follow the label directions and do not apply in succession with JMS Stylet Oil or any other oil-based products or use if temperatures are forecasted to be 90 degrees within 3 days of application.

Table 1: Recommended list of conventional and organic (red font) fungicides labeled for Powdery Mildew Control in Pumpkins, Winter Squash and Gourds. Please be sure to read the labels of the products you are using – this table is not a substitution for the information contained on the label that is attached to the product container. Products in orange are mixes of multiple products that contain at least 1 active ingredient from the same FRAC group and need to be rotated accordingly. Products in RED are labeled for organic use but you should check with your certifying agency to be sure.

Fungicide	FRAC Code	Recommended Rate/Acre	REI	PHI	Seasonal Limits	Comments
Vivando *(Metrafenone)*	U8	15.4 fluid oz	12 hrs	0 days	3 applications	Do not mix with horticultural oils Do not apply more than 46.2 fl ozs/A per year. Do not make more than 2 sequential applications should be made before switching to another FRAC Code
Procure 480 SC *(Triflumizole)*	3	8 fluid oz	12 hrs	0 days	40 fluid ounces total	No more than 2 sequential applications should be made before switching to another FRAC Code
Proline 480 SC *(Prothioconazole)*	3	5.5 fluid oz	12 hrs	0 days	2 sprays	Recommend using a non-ionic surfactant
Rhyme *(Flutriafol)*	3	7.0 fluid oz	12 hrs	0 days	4 applications or 28 fluid ounces	
Quintec[1] *(quinoxyfen)*	13	6 – 8 oz per acre	12 hrs	3 days	4 applications or 32 fluid ounces	Do not use on edible peel cucurbits (ie: cucumbers, green and yellow summer squash). Do not apply more than two consecutive applications of Quintec before alternating to a different mode of action. The total number of group 13 fungicide sprays per crop should not exceed 50% of the total number of powdery mildew sprays.
Luna Experience[3] *(fluopyram)* *(tebuconazole)*	7 & 3	17.0 fluid ounces	12 hrs	7 days	Do not apply more than 34.0 fluid ounces per acre per year	Do not make more than 2 sequential applications before switching to another fungicide not in Group 7 or 3 So do not use Procure, Proline or Ryhme following this material). Also has Gummy stem blight on the label at 10.0—17 fl ozs/acre
Chlorothalonil (Bravo or other labeled formulation)	M5	See specific label	12 hrs	0 days		Please note the "Special Eye Irritation Provisions" on the label
Miravis Prime *(pydiflumetofen)* *(fludioxonil)*	7&12	9.2 - 11.4 fluid ounces	12 hrs	1 day	22.8 fl oz/A/year (two applications per year)	Do not apply within 75 ft of bodies of water such as lakes, reservoirs, rivers, permanent streams, natural ponds, marshes, or estuaries.
Regalia[2]	P5	1—4 quarts/arce	4 hrs	0 days		Apply in 25 – 100 gallons of water per acre Use on a 7-10 interval
Trilogy[2]	NC	0.5—1%	4 hrs	0 days		Can be highly toxic to bees
JMS Stylet Oil[2]	NC	3—6 quarts per 100 gallons water	4 hrs	0 days		

(Continued on page 6)

(Continued from page 5)

Potassium Bicarbonate (MilStop, Armicarb, Kaligreen etc.)[2]	NC	2.5—5.0 lbs	Varies by Product – Read the label!			Please be sure to read the label of the particular product you have as rates and the use of spreader/stickers vary from one product to the next.
Actinovate AG[2]	NC	3—12 ozs	1 hr	0		Requires a spreader/sticker such as NuFilm P or other approved material Use in 20-150 gallons of water/acre Apply on a 7-14 day schedule
Copper	Various formulations please see labels for more information					
Double Nickel 55 Biofungicide	NA	.25—3.0 lbs	4 hours	0 days		Use 0.25 –1.0 lb under low disease pressure and 1.0—3.0 under higher disease pressure.

[1] Do not use on edible peel cucurbits (summer squash, cucumbers).
[2]Approved for organic use, but be sure to double check with your certifying organization.
[3] There are multiple versions of Luna products labeled in NYS but only Luna Experience has the widest label for cucurbits.

Cucurbit Downy Mildew continues to be reported with the newest reports coming from Michigan, Maryland and New Jersey. My concern this week is it appears that we will have a fairly active weather pattern with a few fronts moving through bringing with them thunderstorms and some rain events. That coupled with the fact that the forecasting model indicates a "Moderate Risk for cucurbits in central AL, NJ, far southeast PA, Long Island, CT, RI, eastern MA, southern ME", makes me pretty certain that CDM will show up here in the region shortly. Make sure to have cucurbits, in particular CUCUMBERS, covered with a protectant at least. See the table below for control options. Best control will be to start with Orondis Ultra and rotate with other FRAC groups like Ranman and Zampro.

Risk prediction map for Day 3: Wednesday, July 31

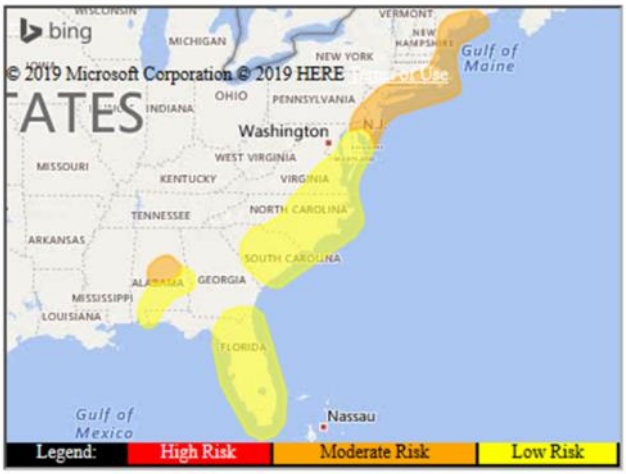


Table 2: Fungicides labeled for Cucurbit Downy Mildew and Phytophthora Blight Control in cucurbits. Products in RED are labeled for organic use but you should check with your certifying agency to be sure.

Fungicide	FRAC Code	Recommended Rate/Acre	REI	PHI	Seasonal Limits	Adjuvant Recommendations
Ranman 400 SC[1] *(cyazofamid)*	21	2.75 fluid ounces	12 hours	0 days	6 sprays	Organosilicone or non-ionic surfactant
Orondis Ultra[1] *(oxathiapiptplin + mandipropamid)*	49 + 40	5.5 – 8.0 fluid ounces	4 hours	0 days	See label for special notes	non-ionic or organosilicone surfactant. Should also be mixed with a copper fungicide. 4 sprays or 33% of applications
Orondis Opti *(oxathiapiptplin + chlorothalonil)*	49+M5	1.75 – 2.5 pt	12 hours	0 days		4 sprays or 33% of total fungicide applications
Tanos 50 DF[1] *(cymoxanil + famoxadone)*	27 + 11	8 ounces	12 hours	3 days	4 sprays	
Omega 500 SC[1] *(fluazinam)*	29	0.75 – 1.5 pt	12 hours	See notes	See label	PHI – 7 days pumpkins, cucumbers, squash; 30 days melons and watermelons

(Continued on page 7)

Curzate 60 DF[1] *(cymoxanil)*	27	5 ounces	12 hours	3 days	9 sprays	Include with one of the other materials listed if DM is detected because this product has a very short residual but has exhibited some burnout activity.
Zampro[1] *(ametoctradin + dimethomorph)*	40 + 45	14 fluid ounces	12 hours	0 days	3 sprays	
Zing! *(zoxamide + chlorothalonil)*	22 + M5	36 fluid ounces	12 hours	0 days	8 sprays	Actual rate of chlorothalonil is below the recommended rate to control DM or PM. Additional chlorothalonil should be added for optimal control (0.43 – 1.43 pints Bravo WeatherStik)
Phostrol, ProPhyt, Fosphite (phosphorus acid containing products)	33	2.5-5.0 pints*	4 hours	0 days	7 sprays	*Rates vary depending on product used. Please review the label for the correct rates.
Copper—Various formulations please see labels for more information						
Regalia Biofungicide	NA	1—4 quarts	4 hours	0 days	NA	Should be applied with copper fungicide
Serenade ASO Bacillus subtilis str QST 713)	NA	2—6 quarts – see label for rates.	4 hours	0 days	NA	Only labeled for *Phytophthora parasitica* so knowing which species you have is important!
Actinovate AG *(Streptomyces lydicus* WYEC 108)	NA	3 –12 fluid ounces	1 hour or until dry	0 days	NA	

[1] Should mix with a protectant partner such as chlorothalonil.
None of the above fungicides will control Powdery Mildew with the exception of Regalia Biofungicide, Serenade ASO and Actinovate AG.

Be Prepared for *Phytophthora capcisi*

Teresa Rusinek, ENYCHP, Cornell Cooperative Extension

Much of the vegetable growing areas in Eastern NY have been on the dry side, which is helpful in keeping *P. Capcisi* from developing. However, some areas have seen some heavy showers and field conditions may be conducive for this disease to develop. Keep an eye on low spots in fields and/or where you've had issues in the past.

P. capcisi is a fungus-like pathogen that survives in soil for many years. The spores can actually "swim" (it has a little whip-like tail it uses to be motile) and when fields are wet or saturated they can move quite effectively from plant to plant to find a new host. *P. capcisi* spores do not blow around from farm to farm like spores of *Pythopthora infestans* (Late Blight) do. The pathogen does spread to new fields through contaminated soil that sticks to tires and tillage equipment and by irrigation and flooding events from contaminated surface waters.

Its host range is fairly large with the most concerning, commonly seen infections happening on peppers and cucurbits. Some beans, tomatoes and eggplant can be infected as well. Often, the parts of the plants that are attacked are where they come in contact with infested soil or soil that splashes up onto the plant. For peppers, symptoms are seen as the plants quickly decline from healthy to wilty, to losing leaves, to dead. Within a week an infected spot in the field can go from green to completely desiccated and brown. Often, the crown will have brown lesions on it. Leaf spots can occur, but most telling is the rapidity at which the leaves fall off and the plant withers. This usually happens in a "spot" in the field and then progresses. Progression and extent of damage depends on factors from time of infection to past and current weather conditions.

On cucurbits, the disease is mostly seen as a white-yeasty growth. Before the yeasty growth (especially on tomatoes and eggplant) you may see a large lesion made up of light and dark rings.

A preventative fungicide application schedule is needed to ensure effective control. See the table "Fungicides for Managing Phytophthora

(Continued on page 8)

(Continued from page 7)

Blight in Cucurbits and Other Vegetables" in this newsletter developed by Margaret Tuttle McGrath, Plant Pathology and Plant-Microbe Biology Section, Cornell University. Conventional and Organic approved materials currently labeled are listed in the chart below.

Phytopthora Capcisi on Pumpkin. Photo: T. Rusinek

P. capcisi Foliar blight, fruit rot, and stem lesion symptoms. Photo: Michigan State University

Fungicides for Managing Phytophthora Blight in Cucurbits and Other Vegetables

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Fungicide	FRAC group	Application + other use restrictions			REI (hr)	PHI (day)	Other labeled vegetables	Comments
		sequential [1]	max [2]	other				
Orondis Ultra	49 + 40	2	4 or 33% of applications, whichever is fewer		4	0	pepper, eggplant, tomato	Use either Orondis Ultra applied to foliage or Orondis Gold applied to soil.
Orondis Gold 200	49	2			4	0		
Omega	29	no limit	4-7	4 at high rate	12	7/30	pepper, eggplant	PHI is 30 days for cucumbers and melons
Gavel	22 + M3	no limit	8		48	5		
Presidio	43	none	2	tank-mix	12	2	pepper, eggplant	Use when downy mildew is not a concern (e.g. early in season)
Ranman	21	3	6	use organo-silicone surfactant	12	0	bean, pepper, eggplant	
Forum	40	2	5	tank-mix	12	0	pepper, eggplant	
Revus	40	none	4	use surfactant	12	0	pepper, eggplant	
Tanos	27	none	4	tank-mix	12	3	pepper	Must be tank-mixed with contact fungicide (copper)
phosphorous acid	33	no limit	none		4	0	pepper, eggplant	Recommended applied at low rate combined with other fungicides
biopesticides		no limit	none			0	varies	Through drip and/or to foliage. Actinovate, Bio-Tam, Double Nickel, Serenade, Taegro, etc.
copper fungicides	M1	no limit			48	2		2(ee) in NY to use tank-mixed with other fungicides: Champ, Champion, Cuprofix Disperss, Kocide

[1] Maximum number of sequential applications that can be made before must switch to other fungicide(s) in different FRAC group. This restriction is for resistance management. Switch for at least as many applications; this is a stated requirement on the Ranman label. So if Ranman is applied 3 times in a row, the maximum allowed, the next 3 applications must be different chemistry. No sequential applications permitted with Presidio (recent label change), Revus and Tanos.

[2] Max refers to the maximum number of applications that can be applied to a cucurbit crop.

Hornworms on Tomatoes

Elisabeth Hodgdon, ENYCHP, Cornell Cooperative Extension

It's time to check your tomatoes closely for hornworms, which appear in July. These large and very hungry caterpillars can quickly defoliate plants and chew holes in fruits if left unchecked. Although one of the largest caterpillars around (3-4 inches long), they can often be difficult to spot because they blend in quite well with tomato foliage. Look for more visible clues that the caterpillars have been feeding. The caterpillars will leave behind copious amounts of dark frass near leaves, stems, and fruits that have been chewed.

Figure 1: A hornworm egg on a tomato leaf. Photo: Alan Eaton, University of New Hampshire

There are two types of hornworms that can show up on tomatoes in the Northeast, the tobacco hornworm (Manduca sexta) and the tomato hornworm (*Manduca quinquemaculata*). Both have the characteristic "horn" and spots down their sides. The tobacco hornworm has six pairs of spots and white markings, whereas the tomato hornworm has only five on its sides. Often, the "horn" of tobacco hornworm will be reddish with age. Both are managed similarly. Hornworm caterpillars eventually develop into very large, dark brown sphinx moths.

Figure 2: Hornworm feeding on a tomato fruit. Photo: Dan Pavuk, Michigan State University Extension

Many insecticides are labeled for use on hornworms and other caterpillar pests (such as tomato fruitworm and yellowstriped armyworm) of tomatoes in New York, including Bacillus thuringiensis kurstaki, pyrethroids/pyrethrins, neonicotinoids, spinosad, diamides, and others. Spot spray or treat the field or high tunnel when populations reach a threshold of 1 caterpillar per plant.

For low populations, hand picking may suffice. However, if you see a hornworm with strange white projections from its back, leave it be! The caterpillar may be harboring a beneficial natural enemy. *Cotesia congregatus*, a naturally occurring tiny wasp, parasitizes hornworm caterpillars. Female wasps lay their eggs on the caterpillars. Eggs hatch into larvae that feed within the caterpillar, and eventually crawl out to spin themselves cocoons (Fig. 1). The white cocoons cling to the weakened caterpillar and eventually, adult wasps emerge. Because of the large size of the caterpillar and clearly visible wasp cocoons, biological control of this pest is quite dramatic.

Figure 3: Parasitized hornworm. Photo: Dan Pavuk, Michigan State University Extension

Figure 4: Adult hornworm moth. Photo: Alan Eaton, University of New Hampshire

Tomato Ripening

Steve Reiners, Cornell University

It takes six to eight weeks from the time of pollination until tomato fruit reach full maturity. The length of time depends on the variety grown and of course, the weather conditions. The optimum temperature for ripening tomatoes is 70 to 75F. When temperatures exceed 85 to 90 F, the ripening process slows significantly or even stops. At these temperatures, lycopene and caro-tene, pigments responsible for giving the fruit their typical orange to red appearance cannot be produced. As a result, the fruit can stay in a mature green phase for quite some time. Light conditions have very little to do with ripening. Tomatoes do not require light to ripen and in fact, fruit ex-posed to direct sunlight will heat to levels that inhibit pigment synthesis. Direct sun can also lead to sunscald of fruit. Do not remove leaves in an effort to ripen fruit. Also, soil fertility doesn't play much of a role. We do know that high levels of magnesium and low levels of potassium can lead to conditions like blotchy or uneven ripening or yellow shoulder disorder. But the slowness to ripen is not likely due to soil conditions and adding additional fertilizer will do nothing to quicken ripening. If you absolutely cannot wait, some growers will remove fruit that are showing the first color changes. These fruit, in the mature green or later phase, could be stored at room temperature (70-75F) in the dark. A more enclosed environment would be best as ethylene gas, released from fruit as they ripen, will stimulate other fruit to ripen. If temperatures remain high outdoors, these picked fruit will ripen more quickly, perhaps by as much as five days. As far as flavor, the greener fruit should develop flavor and color similar to what you would get if field ripened. The key is picking them when they are showing the first signs of ripening (no earlier) and keeping them at room temperature. Do not refrigerate, as this will absolutely destroy their flavor.

Sweet Corn Update

Charles Bornt, CCE Eastern NY Commercial Horticulture

Figure 1: Typical mature Northern Corn Leak Blight lesion on a corn leaf.

We are hearing reports from our colleagues down on Long Island that they are starting to see Northern Corn Leaf Blight (Figure 1) in sweet corn and I'm concerned that the dewy mornings many of us are seeing the last week or so are perfect conditions for this pathogen to get started. I'm also concerned because there is a lot of corn that got planted on ground that had corn last year and there is a lot of corn (field and sweet corn) that got planted late this year and will be prime for NCLB to get started in.

Northern Corn Leaf Blight affects both sweet corn and field corn and is a disease that should not be taken lightly as it can both affect ear quality (discolors the husk leaves) and can essentially defoliate a plant. Look for long, grayish cigar shaped lesions on the lower leaves first. When it gets bad, the entire field will take on a grayish color instead of a nice dark green. In the past I know sweet corn has been rejected by buyers because of low levels of NCLB on the flag leaves of the ears.

The first line of defense for sweet corn is selecting varieties that have NCLB tolerance. This information is generally noted in the seed catalogs, or you can ask your seed sales representative. The second line of defense is a fungicide. There are several recommended materials that can be used and they can be found in Table 1. However, here is the concern: most of the recommended fungicides are either in the FRAC group 3 or 11 or a combination of 3 and 11! This makes rotating a bit difficult as applications should start when the disease first appears. You could alternate between Headline SC and PropiMax EC or Tilt plus a protective material like Bravo or mancozeb (Dithane) or use a pre-mixes called Headline AMP (FRAC 3 + 11) or Stratego YLD (FRAC 3 + 11) and alternate with Catamaran which is a pre-mix of a FRAC group 33 + M5. See table below for more information. **However, pay attention to the pre-harvest interval of these materials as they range from 7 days to 14 days.** You need to rotate between the Group 3 and 11 fungicide groups for fungicide resistance management. Please be aware if you are applying pre-mixes that contain both groups or only a single active ingredient, as this will determine your fungicide schedule.

Again, with sweet corn planting schedules getting screwed up this spring with the weather and a lot more later sweet and field corn planted this year and if the weather continues with frequent showers or heavy dews, NCLB could really get a foot hold here and ruin some of these plantings. Once corn is harvested, corn residue should be destroyed as soon as possible in order to reduce the amount of inoculum and further infection of later plantings. You should also try to rotate out of those fields infected with corn for at least one year or better yet two years, if possible.

Sap beetles: One really quick note on sap or picnic beetles – if you are using strait Coragen for worm control, you may end up dealing with sap beetles as Coragen (chlorantraniliprole) has no activity against this pest. A better option would be to use Besiege (6-10 fluid ounces) which is a pre-mix of Coragen and Warrior/Grizzly(lambda-cyhalothrin). The Warrior portion will help control the sap beetles (and aphids) with the Coragen working on the worms. If all you have is Coragen, you might want to consider adding Warrior/Grizzly to the tank for sap beetle control.

Table 1: Fungicides labeled for Northern Corn Leaf Blight

Fungicide	FRAC Code	Recommend-ed Rate/Acre	REI	PHI (Days)	Seasonal Limits	Adjuvant Recommendations
Catamaran (potassium Phos-phite + Chlorotha-lonil)	33 + M5	4 pints	12 hours	**14**	30 pints/ acre/season	Can be applied by air. Do not add additional protectant as it already contains one.
Headline AMP (pyraclostrobin + metconzaole)	11 + 3	10.0 – 14.4 fl. Ounces	12 hours	7	57.6 fluid ounces/acre per season	Begin applications prior to disease development and continue on a 7- to 14-day schedule if conditions for disease development persist. Use the higher rate and shorter interval when disease pressure is high. DO NOT make more than 2 sequential applications of before al-ternating to a different mode of action.

(Continued on page 11)

(Continued from page 10)

Stratego YLD (prothioconazole + trifloxystrobin)	3 + 11	4.0 – 5.0 fluid ounces per acre	12 hours	0	20 Fluid ounces per season	Alternate every application of Stratego YLD Fungicide with at least one application of a non-Group 11 fungicide. Apply when disease first appears and continue on a 5- to 14-day interval when conditions are favorable. **Use the lowest label recommended rate of a NIS adjuvant to enhance disease control.**
PropiMax EC, Tilt or other labled product (propiconazole)	3	2.0 – 4.0 fluid ounces per acre 4.0 Fluid ounce for Rust	12	14	16.0 fluid ounces per season	DO NOT make more than 2 sequential applications of before alternating to a different mode of action. Apply when disease first appears and reapply 7- to 14-days if conditions are favorable.
mancozeb	M3	See label for rates	24	7		
Priaxor (fluxapyroxad+propiconazole	7 + 11	4-8 fluid ounces	12	7		Do not apply more than two applications per season.
Quilt or other labeled product (azoxystrobin + propiconazole) Quilt Xcel	11+3	7-14 ounces 10.5-14.0 ounces	12	14		**Do not use where drift may reach apple trees.** Alternate application with a non FRAC group 11 containing fungicide.
Elatus (azoxystrobin + benovindiflupyr)	11 + 7	5.0 – 7.3 ounces	12	7		Apply no more than 2 times a season with a minimum 14 day spray interval. Apply with a penetrating/ spreading adjuvant. Do not apply where drift will reach apple trees or use the same sprayer on apple trees.
Bravo, Praiz, Initiate etc. (chlorothalonil	M5	See label	12	14		See label for rates

Corn Trap Counts

Location	CEW	ECB-Z	ECB-E	FAW	WBC
Albany	1	0	0	0	0
Clinton 1	0	0	0	3	11
Clinton 2	0	0	0	0	1
Columbia	11	0	0	6	25
Fulton	0	0	4	0	0
Orange	1	0	0	4	2
Rensselaer	0	0	1	0	0
Washington	0	0	0	0	2

Are You Ready for the Public to Come to Your Farm? Take Steps to Reduce Your Liability as an Agritourism Business

Elizabeth Higgins, CCE Eastern NY Commercial Horticulture

It's summer and many farms in Eastern NY are starting to welcome the public onto their farm. Opening up the farm to the public is a concern for many farms because, despite your best efforts to keep everyone safe, someone could get hurt and sue. In 2017, New York State passed the "Safety in Agricultural Tourism Act (N.Y. Gen. Oblig. §§ 18-301 to 18-303) which eliminates the liability of farmers for injuries and deaths to the public who are engaged in agritourism activities on their farm, if they follow specific steps outlined in section § 18-303 of the Act. New York State Department of Ag and Markets has issued guidance on complying with the law, including required language for signage.

These are the key provisions of the Act that that must be followed in order to be covered by the liability protection of the Act:

- Posting a conspicuous Warning to Visitors sign, notifying visitors of the inherent risks relevant to the on-farm activity, the farm operation and site conditions. The farm operator is responsible for developing this sign and taking reasonable care to prevent reasonably foreseeable risks to visitors.
- Distributing written information to visitors, with language specified by the Department of Agriculture and Markets, directing the attention of all visitors to the required Warning to Visitors sign. The language is available at this link: https://www.agriculture.ny.gov/Press%20Releases/Inherent_Risk_Guidance.pdf
- Posting directional signage and identifying "off limits" areas.
- Posting a conspicuous notice at every point of sale or distribution of tickets that visitors have certain responsibilities identified in the General Obligations Law.
- Posting a conspicuous notice to visitors of the right to a refund for those unprepared or unwilling to accept the inherent risks of the on-farm activity or to the duties of reasonable care imposed on the visitor.
- Providing adequate training to employees.

So how do you know if you are compliant? In their guidance, Ag and Markets specifically states that a "one size fits all" approach is not adequate for signage and training. Your warnings and your signage should reflect the risks on your farm. For example, a farm offering a hay ride will have different risks than a farm that allows children to feed animals or a PYO apple farm. Reasonable hazards could include heat exhaustion, bee stings and tripping hazards. Ag and Markets recommends that farmers work with their insurers or lawyers to perform a risk assessment for their specific farm business. NYCAMH would also be a good resource for assistance. Also be sure to document any trainings that you offer your employees. Have them sign in and keep a copy of the training materials or agenda in your records.

Training on Sexual Harassment Training for Ag Employers

Elizabeth Higgins, CCE Eastern NY Commercial Horticulture

CCE Regional Teams and Cornell Cooperative Extension recently offered programs on how to conduct sexual harassment training for farm owners and managers. All businesses in NYS are required, by law, to provide a sexual harassment training to their employees by October 2019. In the future, the training will need to be provided to all employees annually and all new employees upon hiring.

If you missed the program, the presentations should be uploaded soon and materials made available. I would refer to the Cornell Ag Workforce page for updates and resources. http://agworkforce.cals.cornell.edu/2019/07/03/complying-with-sexual-harassment-prevention-training-in-new-york/


Hemp Field Meeting
Thursday, August 15, 2019
Dr. Larry Smart, Cornell
Variety Selection &
Production
&
Dr. Chris Smart, Cornell
Powdery Mildew &
Intern Field Update
2 Locations
1:00-3:00 PM
Hudson Valley Research Lab
(site of Cornell CBD variety trial)
3357 Rt. 9W
Highland, NY 12528
6:00-8:00 PM
Fields of Brian Pawelski and
Bruce Ludovicy
736 Pulaski Highway
Goshen, NY 10924
Register to Attend
Either location: $20pp pre-registered or $30 per farm (unlimited attendees, pre-registered together)
Pre-registration ends 8/13/2019. At-the-door fee: $40pp.
Register here: http://weblink.donorperfect.com/hempfieldmeeting
Call 845-344-1234 to register with a credit card or if you have questions.

Upcoming Events

Summer 2019, 20-minute Ag Manager Lunchtime Webinar Series
Focused Business Topics for Busy Managers
12:30pm—1:00pm on alternating Tuesdays, June through August

June 18—Making Capital Investment Decisions
July 2—Understanding Financial Statements 1 (Balance Sheets)
July 16—Understanding Financial Statements 2 (Income Statement)
July 30—Understanding Financial Statements 3 (Budgets and Analysis)
August 13—Ag Tax Topics - the Schedule F
August 27—Ag Tax Topics - Sales Tax and Property Tax Issues for Ag in NYS

To register, visit: bit.ly/AgManagerWebSeries

Hemp Field Meetings
August 15, 2019

1:00pm—3:00pm: Hudson Valley Research Lan
3357 Rt 9W, Highland, NY 12528

6:00pm—8:00pm: Fields of Brian Pawelski and Bruce Ludovicy
736 Pulaski Highway, Goshen, NY 10924

Register at http://weblink.donorperfect.com/hempfieldmeeting

IPM in Tomato Production
August 19, 2019 - Davenport Farms, 3072 US Route 209, Stone Ridge, NY 12401

Dr. Margaret McGrath and ENYCHP Vegetable production Specialist Teresa Rusinek will lead a one-hour workshop for growers to discuss and learn how to integrate techniques in managing tomato diseases. The meeting is taking place in the field at Davenport Farms where a disease resistant tomato variety trial is hosted. Growers will have an opportunity to tour the trial, taste fruit, and provide feedback for plant breeders. 1 DEC recertification credit in categories 10, 1a, and 23 will be available to those who attend for the entire duration of the meeting.

Biocontrol Trial and IPM Field Meeting
August 20, 2019 - Eli Martin's Farm, 388 Brookman Corners Rd, Fort Plain, NY 13339

4-5 pm: Dr's Amara Dunn and Meg McGrath will discuss powdery mildew control using biocontrols and organic and conventional fungicides. Crystal Stewart from the ENYCHP will provide a tour of the biocontrol trial and additional squash and pumpkin mini-variety trial.

5-6pm: Walk the farm fields with Dr's Dunn and McGrath and with CVP specialist Elizabeth Buck to talk about integrated strategies to control pests, diseases, and weeds on the vegetables farm. Bring samples and questions! 2 DEC credits have been applied for in categories 1a and 23.

Willsboro Farm High Tunnel Twilight Meeting
August 27, 2019 - 5:00pm-7:00pm
Cornell Willsboro Research Farm, 48 Sayward Lane, Willsboro

Join vegetable specialists Elisabeth Hodgdon, Jud Reid, and farm manager Mike Davis for a high tunnel and field tour at Cornell's Willsboro Research Farm, where they will share research results for the following projects:

- Striped cucumber beetle management using netting and row cover
- Varietal differences in cucumber susceptibility to striped cucumber beetle
- Ground cherry and goldenberry production in field and high tunnel environments
- Overwintered high tunnel spinach nitrogen fertility

Depending on availability, a taste-testing of the different cucumber, ground cherry, and goldenberry varieties will be held. This free program is made possible through funding by the Northern NY Agricultural Development Program.

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