



PENNSYLVANIA VEGETABLE MARKETING & RESEARCH PROGRAM

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Pennsylvania Vegetable IPM Weekly Update

June 23, 2021

These are cooperative projects involving Penn State University researchers, Penn State Cooperative Extension educators, growers, the Pennsylvania Department of Agriculture, the Pennsylvania Vegetable Marketing and Research Program and the Pennsylvania Vegetable Growers Association.

Vegetable Disease Updates

Beth Gugino, Extension Vegetable Pathologist, Penn State University

GENERAL UPDATES:

- There are currently **no reports of late blight** on tomato or potato in the region. If you suspect late blight on your farm, please let me know either by email at bkgugino@psu.edu or by phone at 814-865-7328 or contact your local Extension Office.
- In the past seven days, **downy mildew has been confirmed on cucumber and cantaloupe in southern New Jersey and on cucumber in Maryland on the Delmarva Peninsula**. It has also been reported in several cucumber and/or cantaloupe fields in South Carolina. This is earlier than in the previous few years, so **it is important to be using fungicides to protect both cucumber and cantaloupe crops and to actively be scouting these crops**. Fungicides are most effective when used preventatively when crops are at risk rather than once symptoms are observed in the field. The unsettled weather has put crops in the counties east of Harrisburg at moderate risk and those in the southeastern PA at high risk. If you suspect downy mildew on your farm, please let me know either by email at bkgugino@psu.edu or by phone at 814-865-7328 or contact your local Extension Office. Knowing where the disease is an important component for area-wide management. See <https://cdm.ipmpipe.org> for the latest reports and disease risk forecasts.

FUNGAL FOLIAR DISEASES OF ONION

As onion fields across the state shift with the summer solstice from foliar to bulb production, be on the lookout for the fungal diseases **purple blotch** and **Stemphylium leaf blight**. Both diseases can significantly blight down the leaves resulting in reduced bulb size and yield loss. Purple blotch, caused by *Alternaria porri*, is characterized by zonate lesions (concentric rings similar to early blight on tomato) that are surrounded by tan to yellow leaf tissue. As the disease progresses, multiple lesions can grow together and cause the entire leaf to blight down. Severe purple blotch can cause lesions on the



Zonate lesion characteristic of purple blotch (left) and black sooty-like sporulation of Stemphylium leaf blight (right) (Photo: Beth Gugino).

neck and extend onto the very top of the bulb. Stemphyllium leaf blight starts as small tan lesions that become elongated and often lead to a tip blight. In the center of the lesions sooty-like spores develop which can turn your finger black when you run it across the leaf. Stemphyllium usually will infect the side of the leaf exposed to the prevailing winds or leaf tissue that has been damaged due to equipment or is already infected by purple blotch. Both are favored by warm temperatures and long periods of leaf wetness and it is not uncommon to see both on the same plant. Both pathogens survive in crop debris between seasons so crop rotation is an important management strategy. During the season similar fungicides can be used to manage both diseases, some of the more effective products include Endura, Fontelis and Luna Tranquility (FRAC 7 fungicides) and Inspire Super and Quilt that contain FRAC 3 active ingredients. It is important to rotate between different FRAC codes, resistance to FRAC 11 fungicides (e.g. Quadris, Cabrio, Pristine, etc.) has been documented in New York. Protectant fungicides such as mancozeb or chlorothalonil (7 day PHI) will also help under lower disease pressure.

Keep in mind that with the shift from leaf production to onion bulbing, an adequate supply of pure water to the plants to facilitate bulb formation more important than fertilizer. Nitrogen is needed early in the season for promote foliar growth which in turn is then used to support bulb formation. Excess nitrogen late in the season can also lead to an increased incidence of bacterial diseases such as center rot.

BE ON THE LOOKOUT FOR POWDERY MILDEW IN CUCURBIT CROPS

Powdery continues to be an annual concern in cucurbit production. Since the pathogen (primarily *Podosphaera xanthii*) overwinter in the Northeast and mid-Atlantic regions, the pathogens move into our production fields from other nearby sources typically moving from the southeast up along the east coast or in some cases from more northern sources.

The **first signs of powdery mildew** are small white powdery spots most commonly seen on the underside of the leaves or within the plant canopy. When scouting, it is important to thoroughly look over the entire plant. Also scout by cultivar to account for differences in host

resistance; usually scouting the most susceptible cultivars first around the time of fruiting. Pressure from powdery mildew increasing during the course of the season as the pathogen moves up the east coast following cucurbit production. Disease pressure will be least on early seeded crops and highest on late seeded crops planted after early to mid-June. If protectant fungicides are being used, sometimes the spots on the upper leaf surface are yellow or chlorotic with white powdery lesions on the corresponding underside of the leaf. Accurate diagnosis is critical because targeted conventional fungicides applied for managing powdery mildew are different than those

used for downy mildew

When powdery mildew occurs early in the season and is left unmanaged it can severely reduce the photosynthetic area of the leaves needed to produce high quality marketable fruit. On pumpkin later in the season, it can also severely damage the handles leaving them weak further reducing marketability. **Fungicides are an important tool** for managing powdery mildew in-season however, resistance management is a concern. It is recommended that the most effective products are applied when symptoms are first observed (one powdery mildew spot on 45 to 50 mature leaves) and then later in the season when switch to a



Severe powdery mildew on a susceptible pumpkin cv. Howden at the end of August 2017. No fungicides applied (top) or a weekly rotation of targeted fungicides tank mixed with Bravo WeatherStik (5 total applications) (Photo credit: Beth Gugino).

protectant spray program rather than the reverse. In the long run this will reduce the selection pressure for powdery mildew spores that are resistant to the fungicide because fewer spores are exposed to the active ingredient when disease severity is low.

Annually since 2009, pumpkin powdery mildew fungicide trials have been conducted on a susceptible pumpkin cultivar such as Sorcerer and Howden at the Russell E. Larson Research and Education Center in Centre Co., PA. Products that continue to be the most effective and should be used at the beginning of a powdery mildew targeted fungicide program include Vivando (U8), Luna Experience (3 + 7), Quintec (13), and Gatten (flutianil, U13 – newer product). These are best used when alternated with FRAC 3 products such as Procure, tebuconazole, Proline, Rally, Rhyme, Inspire Super (3 + 9), Aprovia Top (3 + 7) as well as Pristine (7 + 11), Magister (39), Miravis Prime (7+12) or Torino (U06). Each application should be applied tank mixed with a broad-spectrum protectant fungicide to manage for fungicide resistance and always rotate between FRAC codes with each application. See the [2020-21 Mid-Atlantic Commercial Vegetable Production Recommendations](#) for additional recommendations.

Due to increasing **concerns about pollinator health** and their exposure to fungicides such as chlorothalonil when possible, time fungicide applications when fewer pollinators are foraging and visiting flowers and flowers are closed. In trials conducted over the past couple of years to identify alternatives to tank mixing with chlorothalonil, both Tritenk (mineral oil) and Microthiol Disperss (sulfur) were determined to be equally effective tank mix partners and pose less of a risk to bee health.

Fortunately, cucurbit powdery mildew is one of the easier diseases to **manage organically** and there are a number of options including copper, sulfur, oil-based products like Eco E-rase (jojoba oil), JMS Stylet oil (paraffinic oil), Trilogy (neem oil) and Organocide (sesame oil), as well as potassium bicarbonate-based products such as Kaligreen and MilStop to name a few. With these products, spray coverage is essential since they are only effective at the site of application. So, apply them in a large enough volume of water at a higher pressure to move the spray and penetrate the plant canopy.

RECRUITING HIGH TUNNEL TOMATO GROWERS FOR A STATEWIDE TARGETED SOILBORNE DISEASE SURVEY

The Vegetable Plant Pathology Lab, led by Beth Gugino, is recruiting grower collaborators from across the state for a soilborne disease survey of high tunnels that have been in continuous tomato production for more than two years. Reduced plant vigor and yield losses due to soilborne diseases are often attributed to other issues that arise during the production season such as nutritional deficiencies. Our previous survey work in 2019 and 2020 suggests that soilborne diseases such as corky root rot (*Pyrenochaeta lycopersici*), black dot root rot (*Colletotrichum coccodes*), and root-knot nematodes (*Meloidogyne* spp.) are increasingly problematic in PA high tunnel tomatoes and may be contributing to reduced yields.

We are interested in collecting a small composite soil sample (about ½ gallon total) that will be tested for soilborne pathogens at no charge. Participants will receive a report indicating which soilborne pathogens are present in your high tunnel soils and suggested disease management recommendations.

This survey will help us to identify which soilborne pathogens are affecting high tunnel tomato production systems across the state and develop more targeted soilborne disease management strategies for our growers.



Top - Typical high tunnel tomato production in PA (Photo: Elisa Lauritzen).

Bottom - Root galling on tomato roots caused by root-knot nematodes. The root damage can lead to reduce plant vigor and yield (Photo: Elisa Lauritzen).

For more information or if you are interested in participating, please contact Elisa Lauritzen, jel412@psu.edu or 385-234-0579 for instructions on how to collect and submit a soil sample. We will be using several of the produce auctions as sample drop-off locations for your convenience

PA Vegetable and Berry Current Issues as of June 22

Beth Gugino, Shelby Fleischer, and Kathy Demchak – Penn State Extension

General conditions: Much of the state has experienced strong storms over the past week that in some cases caused considerable crop damage and locally flooded fields. Wet and humid conditions tend to favor diseases over insect pests, however scouting for both is as important as ever. After a couple of drier days towards the end of this week, there is more unsettled and humid weather in the extended forecast with spotty showers and average temperatures. For more information check out Penn State Weather World (<https://weatherworld.psu.edu>).

FIELD PRODUCTION

Last week **downy mildew was confirmed on cucumber in southern New Jersey and in Maryland on the Delmarva Peninsula**. There have also been additional reports on cucumber in North and South Carolina. The unsettled weather and nearby inoculum sources have made conditions favorable for disease development across the eastern PA. The use of fungicides for downy mildew management on cucumber and cantaloupe is recommended.

Currently there are no reports of **late blight on tomato or potato** in the region. There continue to be reports of poor stand establishment in some potato plantings. In some cases, blackleg/soft-rot caused by *Dickeya* and *Pectobacterium* spp. was suspected which led to soft rot-like symptoms. However, in other cases the planted seed piece was intact but not producing shoots or roots. If this is the case, cut the seed tubers in half and look for symptoms of **Fusarium dry rot**. It causes dry cavities in the center of the tuber that can be covered with white to pinkish fungal growth however, if secondary bacterial organism invades then it can also lead to a general soft rot.

Be scouting for **bacterial leaf spot in pepper** and **angular leaf spot in cucurbits**. Both bacterial diseases are easily spread by wind-driven and splashing rain. While host resistance for angular is not available for cucurbits other than cucumber, there are lots of pepper cultivars with resistance to bacterial leaf spot. The challenge is matching the resistant cultivar to the pathogen population on your farm. Bacterial leaf spot on pepper can be caused by 11 different races of *Xanthomonas* spp. For example, if you grow Aristotle X3R which has resistance to races 1, 2 and 3 but develop bacterial spot then races 4 through 10 might be present on your farm. Compare that to cv. Archimedes that has resistance to races 0 to 3, 7, and 8. Keeping good records on pepper cultivars and the presence or absence of bacterial leaf spot is an important management tool for disease prevention. Some of the newer pepper cultivars such as Playmaker and 9325 have resistance to races 0 to 10 (X10R) however, under our growing conditions the pepper fruit tend to be boxier rather than elongated in shape which can be perceived as a negative trait.

Corn earworm trap counts have been surprisingly high for this time of year in Bedford and Lancaster counties, and approaching spray thresholds in York



Characteristic foliar lesions on pepper caused by bacterial leaf spot. Similar symptoms can also develop on the fruit. Photo: Beth K. Gugino.



Corn earworm larva feed on from the tip end of the ear and can leave large amounts of frass. Photo: H. Fescmeyer

County as well. Tassel and silking corn will be highly attractive to these moths. Eggs are laid on silk, and insecticide control requires contact to the very young larvae, before it moves into the ear.

Many commonly occurring insects of vegetable crops are appearing, often in low numbers or few locations. **Flea**



beetles are causing shothole damage, especially to

Pale striped flea beetle adult (left), and characteristic shot hole damage (center) (Photo: W. Cranshaw, Bugwood), and two spotted spider mites (right) Photo credit Univ. Nebraska, Wright, Campbell, Hein.

eggplant. **Spider mites** are showing up in vine crops and strawberries. Spider mites often initiate populations in localized aggregations. **Onion thrips** are being reported in onions. **Colorado potato beetles** are being reported. As growers and gardeners are harvesting garlic, people are finding **Allium leafminer** pupa in the stalks or between the cloves. **Sap beetles**, also known as picnic beetles, have been higher than usual in recent weeks in strawberries, and they are now also showing up as a secondary problem, following bacterial infections, in onions. Initiate sanitation (clean harvest, clean up fields after harvest) now to avoid sap beetle problems in sweet corn later in the season. The **cabbage white butterfly**, an easily visible beautiful day-flying insect, is active now. Feeding from the larva of cabbage white makes large holes in cole crops. **Onion thrips** are being reported in onions.

BERRY CROPS

Strawberry **fruit-rotting diseases** were minimal this year, though hot spells during harvest often caused fruit to ripen too fast for pickers to keep up. Growers should renovate fields as soon as possible once harvest is complete to keep diseases from multiplying on unharvested berries and old foliage and to prevent **sap beetles** from multiplying and then moving to other susceptible crops such as sweet corn and muskmelons.

Current wet conditions are increasing the likelihood of **cane diseases** infecting brambles and blueberries. These diseases can disrupt translocation of nutrients and water in the plant and is one reason why berries sometimes fail to size during harvest. Blueberry diseases that we are seeing include **Phomopsis** and diseases caused by **Botryosphaeria**. Growers should keep an eye out for newly infected

blueberry cane tips and cut out diseased canes

Symptoms consistent with Botryosphaeria stem blight on a susceptible variety. Photo: K. Demchak.

low enough to reach

wood that is a healthy light green color all the way across. If any brown discoloration is encountered, continue to cut the canes lower until tissue is healthy – this means all the way to the crown if necessary.

Though **spotted wing drosophila** (SWD) numbers are still very low, this pest multiplies rapidly under damp conditions and moderate temperatures. Many growers are spraying

raspberries and blueberries as the fruit starts to color to prevent infestations. A synthesis of the 2021 ratings of insecticides for efficacy may be downloaded as a

Brown pith in center of cane (above) and dying tip (below) consistent with Phomopsis stem blight infection during summer on blueberry. Photo: K. Demchak.

pdf from the Sustainable Spotted Wing Drosophila Management project web site here: <https://swdmanagement.org/publications-from-our-project/>. This



is a rating of many products, though not all are labeled for use on the various berry crops. This also includes information on products in different pesticide classes which should be rotated to avoid SWD resistance buildup. Listed in order of pesticide group number, products obtaining a good to excellent rating which may be used in Pennsylvania for brambles and that only have a 1-day PHI include malathion in group 1B, Mustang Maxx in insecticide group 3, Delegate in group 5, and Verdepryn in group 28. Products obtaining a good to excellent rating that can be used on blueberries and that have a 3-day PHI or less include Lannate in group 1A, Imidan and malathion in group 1B, Mustang Maxx, Danitol, or Brigade, all in group 3, Delegate in group 5, and Verdepryn and Exirel, both in group 28. Note that some products are restricted use. Growers in other states should check to be sure that these products can be used where they are located. Growers are also encouraged to use cultural controls such as very thorough and frequent harvest, removal of all fruit from the field, and any practices that improve foliage drying in order to provide a less hospitable environment for SWD.

Sweet Corn Insect Pest Monitoring

Shelby Fleisher, Extension Vegetable Entomologist, Penn State University

Corn earworm (CEW) catch is positive in 14 of 16 reporting sites. Sites in Bedford and Lancaster exceeds spray thresholds, sites in Indiana and York are also close to thresholds. **Tasseling and silking corn will be very attractive.** Moths will also lay eggs on many host plants when corn is not available. Tomatoes and hemp make a good host (CEW is also known as “tomato fruitworm”). **European corn borer (ECB) adults** should be active now, but counts were very low (≤ 2) at 4 sites, and zero at 8 sites. ECB levels have been declining due to Bt field corn. However, localized ECB populations remain. Scout for feeding damage and shothole patterns. **Fall armyworm (FAW)** counts were all zero. **Average weekly catch** –moving average for the last 7 days.

County	Trap Name	CEW		ECB		FAW	
		15-Jun	22-Jun	15-Jun	22-Jun	15-Jun	22-Jun
Blair	Tyrone	4	6	0	0	0	0
Bedford	Martinsburg	31	58	0	0	0	0
Bucks	Bedminster	0	0	0	1	0	0
Centre	State College	2	6	0	0	0	0
Centre	Rock Springs	2	1	0	0	0	0
Clinton	Loganton		0		0		
Indiana	Brush Valley		10				
Indiana	Creekside		5				
Lancaster	Landisville	7	29	0	0	0	0
Lancaster	Neffsville	5	1	0	2	0	0
Lancaster	New Danville	11	2	0	0	0	0
Lycoming	Montoursville		4		2		
Washington	Venetia		8				
Bradford	Bristols		3		0		0
Bradford	Ahern		0				
York	York	4	11	0	1	3	0



Corn earworm



ECB feeding damage.

THRESHOLDS: Reproductive (tassel/silk) and late vegetative corn attracts moths. Shorten spray schedules when populations increase. If CEW is not a problem, then consider ECB.

	CEW		ECB	
	Catch/Week	Spray Frequency (days)	Catch/Week	Spray Frequency (days)
Almost Absent	1-13	7 or more	<15	7 or more
Very low	14-35	5-6	15-35	6
Low	36-70	4-5	36-70	5
Moderate	71-349	3-4	>70	4
High	>350	2-3		

