



PENNSYLVANIA VEGETABLE MARKETING & RESEARCH PROGRAM

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Pennsylvania Vegetable IPM Weekly Update

June 8, 2022

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.

PA Vegetable and Berry Current Issues

As of June 7, 2022

Beth Gugino, Shelby Fleischer, Kathy Demchak, and Karly Regan, Penn State Univ. and Extension

GENERAL CONDITIONS

The long-range forecast from NOAA is predicting that conditions in the eastern U.S. will be slightly warmer and rainier than average this season while the western U.S. will remain hotter and drier. Regular scouting for diseases will be even more critical this season with the anticipated wet weather. When trying to decide whether or not to apply a fungicide in advance of a rain, consider the rainfast period of the product (check the label). It is important to apply fungicides when the leaves are dry to prevent excess run-off. Also include adjuvants that are recommended on the label to help the product adhere to the plant surface. For protectant fungicides (such as captan, thiram, mancozeb or chlorothalonil), the rule of thumb is one to two inches of rain will remove half of the residue. Shorter intervals between sprays may be needed to protect newer growth. Pay attention to the total number of applications and amount of active ingredient that can be applied in a season and try to plan so you do not run out of options when you need them most.

HIGH TUNNEL PRODUCTION

While growers are focusing more on field production, high humidity diseases such as **leaf mold** are developing in high tunnels in part due to increasingly dense plant canopies. The pathogen that causes **timber rot on tomato or white mold on snap bean** has also been observed on peppers. Cool wet weather favors the development of this fungal pathogen, *Sclerotinia sclerotiorum*. It has a very wide host range that includes almost all crops commonly grown in high tunnels. Effective fungicides and crop rotations as management options are limited so reduction of inoculum through sanitation is important. Removing infected plant tissue before the sclerotia form, thus preventing them from dropping to the soil, is critical; they can survive for years in the absence of a host. **Magnesium deficiency in high tunnel tomatoes** is a common sight this time of year as the crops are setting fruit.



Dark sporulation characteristic of leaf mold on tomato. It can look similar to downy mildew on cucumbers. Photo: B.K. Gugino.

Striped cucumber beetles have been detected in various cucurbit crops this week, including high-tunnel cucumbers as well as field-grown squash. Adults are attracted to volatiles from cucurbit cotyledons, an aggregation pheromone emitted by males, and the combination of this pheromone and volatiles coming from frass and plant-feeding. Females lay eggs at the base of plants, and larvae feed on roots. Minimizing the immigration of these overwintered adults will go a long way towards minimizing populations later in the season. Neonicotinoids are effective but are systemic and are highly toxic to bees. Limiting neonics to treated seed such as FarMore FI400, which includes the neonic thiamethoxam, keeps the residues that show up in nectar and pollen at very low or non-detectable levels. Very low rates applied to transplants may also reduce residues to which bees are exposed. In addition to feeding on crops, these beetles can be particularly problematic through their ability to spread the bacteria that cause cucurbit bacterial wilt, particularly in cucumbers and melons. Make sure to scout for these pests and be prepared to manage them if necessary. Once bacterial wilt has affected the crop, there is no rescue treatment to manage it so transmission must be prevented by managing beetle activity.



Striped Cucumber Beetle. Photo: N. Sloff, Penn State.

FIELD PRODUCTION

Monitoring for **fall armyworm** and **corn earworm** via pheromone traps has begun across much of Pennsylvania. So far, very few moths of either species have been captured. We will be providing weekly updates on these trap catches as the season progresses to help guide spray decisions for growers who will use insecticides to manage them. If you have planted Bt sweet corn with the VIP traits for corn earworm, you will likely see minimal damage from caterpillar feeding but may still need to scout and treat for other pests, such as sap beetles or flea beetles. If you have not planted VIP corn, keep an eye out for our reports as your corn approaches tasseling as this is when management should begin.

Damage from **thrips** continues to show up in numerous crops. Common species in vegetable crops in our area include **Onion thrips**, **Eastern flower thrips**, and **Western flower thrips**. Insecticide options will vary with the crop. In tomatoes and onions, the spinosyns materials (Radiant, Entrust which is OMRI-labelled) have been the most common insecticide used against thrips, but resistance is suspected for some populations. Diamides (such as Harvanta) are labelled for thrips on tomatoes, and multiple neonicotinoids and pyrethroids are also be labelled. Also continue to scout for **spider mites**.

Sap beetles have been observed in several crops. Adults overwinter in wooded areas and protected locations, and then tend to build where adults and larvae can feed on 'free sugars'. In field settings, this is often unharvested ripe berries, cantaloupes, and other fruit. Populations can then move into sweet corn, where they can be very difficult to control. Farms with both strawberries and sweet corn should try to avoid having a population of sap beetles build up in their berry crop. Compost piles or areas where produce may be discarded are also where sap beetle numbers multiply. Sap beetles and mycotoxins - Aspergillus and Fusarium - have a complex interrelationship. Sap beetles belong to a family of beetles that transport fungal spores, and the interaction of these fungi with the plant tissue may be important for the insect's development. When we do find sap beetles in sweet corn, we often find lots of larvae in a single ear, even in crops that have been sprayed.



Sap beetle adult (Photo: M. Price)

Cucurbit downy mildew is currently reported as far north as eastern North Carolina on cucumber and in coastal South Carolina on cucumber (*Cucumis sativus*) and acorn/yellow/summer squash (*Cucurbita pepo*). We are learning that cucurbit downy mildew has two host-adapted clades. Clade 2 more frequently affects cucumber and cantaloupe (*Cucumis melo*) and affects these crops in our region every year. In the past seven years, downy mildew has been first reported on cucumber as early as 23 June and as late as 22 Aug. This is compared to Clade 1 which affects squash, pumpkin (*Cucurbita maxima*), butternut squash (*Cucurbita moschata*) and watermelon (*Citrullus lanatus*). There are many years when this clade/strain of the pathogen does not affect this region or it shows up late enough in the season that we do not need to apply fungicides for management. Keep in mind that cucurbits are susceptible to downy mildew at any stage of growth from seedlings to mature plants and regular scouting is essential. Fungicides are currently our primary management tool.



Progression of downy mildew lesions on cucumber which start light yellow/chlorotic but become more water soaked and tan. Photo: B.K. Gugino.

BERRY CROPS

Strawberry harvest is well underway, and an assortment of issues are creeping in. Problems vary with the farm and sometimes depend on nursery source and variety. Issues include **Neopestalotiopsis** mainly in plasticulture 'Chandler' (see <https://extension.psu.edu/be-on-the-lookout-for-neopestalotiopsis-on-strawberries>), **Phytophthora crown rot** in plasticulture 'Flavorfest', for which it is getting too late to treat for this year, and fruit anthracnose on an assortment of varieties (see <https://extension.psu.edu/strategies-for-effective-management-of-botrytis-and-anthracnose-fruit-rot-in-strawberries>).



Sunscald causes a bleaching of berries on the upward-facing portion of the fruit. Photo: K. Demchak.

Both cyclamen mites and spider mite numbers have been picking up in strawberries across the state. Leaves of strawberry plants infested by cyclamen mites will appear stunted or crinkled and leaving the mites uncontrolled can result in dwarfed fruit or reduced fruit set. At this point it will be difficult to get miticides into the crown area for cyclamen mite control. As noted in the last update, the next good window of opportunity for treatment of this pest is at renovation for matted-row plantings. Spider mite feeding will cause leaves to become bronzed or yellowed and may also be accompanied by webbing if numbers are high enough, as mites use silk to disperse to new plants. Spider mite populations increase rapidly in hot, dry weather. Consider applying a miticide to control two-spotted spider mites, ensuring good spray coverage in order to improve efficacy. If you are managing other pests with insecticides (which do not control mites), choose the most selective effective product available to avoid eliminating natural enemies of pests that can help to provide control of both types of mites.

Both ripening and green strawberries have suffered **sunscald** during the hot days that we had following a spell of cool cloudy weather. Sunscalded strawberries first appear bleached and soft, but after a few days have passed, the damage could be mistaken for a fruit rot as tan sunken areas develop where the fruit tissue has died. At this point, sunscald can be differentiated from fruit rots because symptoms are only on the upward-facing portions of the fruit and are more common on berries facing South.



Exoskeletons of tiny spongy moth larvae found in dead blueberry blossom clusters and their frass. Their feeding on pedicels resulted in blossom death. Photo: K. Demchak.

Some growers are reporting **smaller-than-usual strawberries** which may be due to dry conditions as the berries were sizing. However, in other instances where some or all of the primary blossoms were damaged by frost early in the season, secondary or tertiary fruit are comprising the majority of the harvest. While some compensation in size occurs once the primary blossoms are lost, the secondary and tertiary berries will never be as large as the primary berries would have been.

In the previous update, we discussed the presence of **spongy moth** (*Lymantria dispar*, previously known as “gypsy moth”) being present in high numbers on blueberries. In a rather uncommon occurrence, early instar caterpillar feeding resulted in damage to flower pedicels, causing death of individual flowers and sometimes the entire flower cluster. This could have easily been mistaken for a blossom blight caused by botrytis, Phomopsis, mummy berry, or anthracnose, except that once the blossom cluster was pulled apart, some webbing, the tiny larval exoskeletons, and frass could be found. A similar situation had been documented in Rhode Island in 2017.

The best time to treat for this pest is when caterpillars are still small and in their early instars when the Btk strain of Bt (*Baccillus thuringiensis* var. *kurstaki*) is effective. Earlier instars can be differentiated from later instars by their black head capsules.

Vegetable Disease Updates

Beth Gugino, Extension Vegetable Pathologist, Penn State

GENERAL UPDATES:

- There are currently **no reports of late blight on tomato or potato** in the region. There are also **no reports of basil downy mildew**. If you suspect you have either disease 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.
- There was at least one report of **storm damage due to heavy rains on onion** this past week. Storm damage is distinguished from thrips feeding injury because the damage is primarily on the side of the leaves exposed to the prevailing winds. The opposite side of the leaf will appear undamaged. Thrips feeding injury will cause silvering on all sides of the leaf. However, both storm damage and thrips feeding injury will make the plants more susceptible to bacterial diseases as well as purple blotch and Stemphyllium leaf blight.
- Currently **cucurbit downy mildew (CDM)** has been reported as far north as the eastern North Carolina on cucumber and in central South Carolina on cucumber (*Cucumis sativus*) and acorn/yellow/summer squash (*Cucurbita pepo*). The recent weather patterns have not put cucurbit crops in the mid-Atlantic region risk however, regular scouting is recommended. Weekly reports on the status of CDM are posted in the educational kiosks at many of the produce auctions, in PVGA and Penn State Extension updates like these as well as via the 1-800-PENN-IPM hotline. If you want to receive automatic alerts via text or email from the CDM ipmPIPE monitoring website, you will need to [sign-up or re sign-up](#) if you were signed up before due to a change in the IT platform hosting the website. For emails, EDDMapS Alert will now be the subject line from alerts@cdm.ipmpipe.org. Please report suspected downy mildew. The reliability of the forecasted depends on knowing where sources of pathogen inoculum.



Severe storm damage on the exposed side of the onion leaf. (Photo credit: Beth Gugino).



Classic symptoms of downy mildew on the upper leaf surface of cucumber. Angular lesions are initially chlorotic before turning tan and necrotic. (Photo credit: Beth Gugino).

Clinic Corner: Findings from the Penn State Plant Disease Clinic

Jennie Mazzone, Research Technologist and Assistant Diagnostician, Penn State

ROOT ROT AND GRAY MOLD ON GREENHOUSE TOMATO

A tomato sample was submitted to the [Penn State Plant Disease Clinic](#) from Berks County, PA in April. These greenhouse-grown plants displayed rotted roots and large, sunken stem cankers. The stem cankers had extensive gray fungal sporulation, which was identified as *Botrytis* sp. through microscopy and culture tests. Root rot symptoms were severe and included necrosis and sloughing (separation of outer root sheath from cortex). Culture tests from the roots identified *Pythium* sp.

Botrytis blight, also known as gray mold, is a common problem in protected culture environments where relative humidity is high. This pathogen can thrive when temperatures are cool. Plants that have been wounded or stressed by another biotic or abiotic problem are more susceptible to this disease, which is likely the case here given the damage caused by *Pythium* root rot.

Pythium causes root rot on tomato and is more severe in environments with poor soil drainage, soil compaction, prolonged soil saturation, and any other condition/situation that might result in wet soils. High soluble salts can also weaken plant roots and predispose them to *Pythium* infection. A common source of elevated soluble salts is heavy fertilization.

Successful *Botrytis* management relies on proper sanitation and cultural disease management tactics (avoid plant injury/stress, improve air circulation, maintain temperatures above 60°F). Cultural disease management is equally important for *Pythium*, which recommends increasing drainage and minimizing soil saturation. Refer to the [Mid-Atlantic Commercial Vegetable Production Recommendations](#) for additional management recommendations, including fungicide recommendations, for *Botrytis* and *Pythium*.

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Pictured in the top left, late-stage, severe root rot (left) and early-stage root rot (right); Necrosis and sloughing root rot symptoms on tomato (bottom left); tomato stem cankers with gray fungal sporulation caused by Botrytis (top right). (Photo credits: Jennie Mazzone).