



PENNSYLVANIA VEGETABLE MARKETING & RESEARCH PROGRAM

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Pennsylvania Vegetable IPM Weekly Update

September 14, 2022

This will be the last IPM Weekly Update for the 2022 season.

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.

Pest Watch Report

Karly Regan, Penn State Extension Educator

MOTH CATCH VARIABLE AGAIN THIS WEEK

This will be the last update for the 2022 season, as some sites finished monitoring last week and most others will finish this week. Of the sites reporting this week, corn earworm numbers caught in traps reporting data this week were variable. Blair and Franklin Counties experienced average catch per night of 60-62 moths, which would mean a spray interval of every 2-3 days would be suggested for corn that's tasseling or silking. Sites in Bedford, Centre, Juniata, Lehigh, Washington, and York Counties experienced average catch per night of 13-47 moths, which means a spray interval of 3-4 days would be suggested. Clinton County experienced average catch per night of 7 moths which means a spray interval of 4-5 days would be suggested. Indiana County caught less than one moth per night, putting it below the spray thresholds. As a reminder, corn that is tasseling or silking is very attractive to corn earworm, as eggs are laid on silks, and control must be achieved while larvae are recently hatched before they've entered the ear.



Fig 1. A corn earworm adult, recognizable by its thin filament antennae and green eyes.

Once the spray threshold is reached, you can consider products from the pyrethroid class, diamide class, or spinosyn class for effective control. We tend to see the best efficacy from non-pyrethroid products, as pyrethroid resistance has increased in migrating corn earworm populations. Particularly, we tend to see more resistance later in the

season, as moths migrate from further south in the United States up to our region. Consider consulting the Mid-Atlantic Commercial Vegetable Recommendations guide for products to use. Diamides and spinosyns do not provide effective



Fig. 2. Fall armyworm feeding damage on corn

control of other pests such as sap beetles, stink bugs, Japanese beetles, or adult corn rootworms. If you're seeing these pests as you scout your corn, consider adding a pyrethroid, or the premix Besiege to control those.

Fall armyworm catch remains very low this week with 2 or fewer moths caught in Bedford, Centre, Clinton, Juniata, and Lehigh Counties, and zero caught in all other counties reporting this week. By managing for corn earworm, fall armyworm should be adequately controlled, as well. Fall armyworm damage can occur on the ear, as well as on the foliage. Foliage feeding will leave ragged edges and waste that resembles sawdust.

Our thanks to growers who have hosted the sweet corn insect traps this season.

Average weekly catch – 7-day moving average. The average catch per night (total catch, divided by the number of nights trapping), divided by the number of nights where data exist, multiplied by 7. If no data exist for that week, null is reported.

| County | Site | CEW | | | FAW | | |
|-------------|----------------|--------|-------|--------|---------|---------|---------|
| | | Aug 29 | Sep 7 | Sep 14 | Aug 22 | Sep 7 | Sep 14 |
| Bedford | Curryville | 4.7 | Null | 27 | 0 | 0.3 | 2 |
| Blair | Sinking Valley | 23.1 | Null | 59.7 | 0 | Null | 0 |
| Bucks | Doylestown | 34.3 | Null | 0 | 0.3 | Null | Null |
| Butler | Cabot | 0 | 4.5 | Null | No trap | No trap | No trap |
| Centre | State College | 2.4 | 5.1 | 1.9 | 0.3 | 0 | 0 |
| Centre | Rock Springs | 8.7 | 9.9 | 16.3 | 0 | 0.4 | 0.3 |
| Clinton | Loganton | 1.7 | 5.5 | 6.7 | 0 | 0 | 1.14 |
| Franklin | Shippensburg | 24.7 | 46 | 62 | 0 | 0 | 0 |
| Franklin | Waynesboro | 38.3 | 50.1 | 48.8 | 0.1 | 0.9 | 0 |
| Indiana | Indiana | 0.4 | Null | 0.9 | 0 | Null | 0 |
| Juniata | Port Royal | 2 | Null | 19.2 | 0.3 | Null | 0.1 |
| Lancaster | Landisville | 24.3 | 25.1 | Null | 0 | 0 | Null |
| Lancaster | New Danville | 15.4 | 23.8 | Null | 0 | 0 | Null |
| Lancaster | Neffsville | 34 | 30.3 | Null | 0 | 0 | Null |
| Lehigh | Germansville | 33.5 | 81.9 | 24.1 | 0 | 0.6 | 0.3 |
| Luzerne | Drums | 1.4 | 13.8 | Null | 0 | 0 | Null |
| Lycoming | Linden | 1.8 | Null | Null | 0.4 | Null | Null |
| Lycoming | Montoursville | 0.1 | 2.9 | Null | 0.6 | 0 | Null |
| Mifflin | Belleville | 10.1 | Null | Null | 0.9 | Null | Null |
| Montgomery | Souderton | 37.4 | Null | Null | 0 | Null | Null |
| Northampton | Easton | 30.3 | Null | Null | 0 | Null | Null |
| Washington | Venetia | 15 | 20 | 13.3 | No trap | No trap | No trap |
| York | York | 9.3 | 9.3 | 33.3 | 0 | 0 | 0 |

THRESHOLDS Reproductive (tassel/silk) and late vegetative corn attract moths. Shorten spray schedules when populations increase.

| Threshold based on CEW | Catch per week | Spray Frequency |
|------------------------|----------------|-----------------|
| Almost Absent | 1-13 | 7+ |
| Very low | 14-35 | 5-6 |
| Low | 36-70 | 4-5 |
| Moderate | 71-349 | 3-4 |
| High | >350 | 2-3 |

PA Vegetable and Berry Current Issues for September 12, 2022

Beth Gugino, Kathy Demchak, and Karly Regan, Penn State

GENERAL CONDITIONS

According to the [Northeast Regional Climate Center](#), August was warmer than average across the state with the eastern half of PA averaging 2 to 4°F warmer. Philadelphia recorded its hottest August on record with 19 days over 90°F and 11 days of low temperatures above 75°F. Precipitation was highly variable across the state with the rains over Labor Day weekend alleviating some of the dry conditions from August. Although excited about the rain, many growers are now reporting cracking and fruit rots on tomato and other crops because of the significant rains. NOAA's Climate Prediction Center monthly temperature outlook forecasts warmer than normal temperatures with there being equal chances of the average precipitation being above or below normal.

FIELD PRODUCTION

Celery leaf curl was reported on celery in western PA. It has been several years since there were a number of outbreaks of this disease in PA and other larger celery production regions. It is caused by a couple of species of *Colletotrichum* and causes the leaves to become curled and distorted similar to a viral infection or herbicide drift injury. Brownish necrotic lesions will develop near the base of the petioles and on the growing point. The pathogen is suspected to be seedborne so planting high quality seed is recommended. Fungicides can help slow the spread and those in FRAC Group 11 are most effective. Disease development is favored by wet and very warm conditions (temperatures around 85°F).



Left distortion (left) and petiole lesions characteristic of leaf curl (anthracnose) on celery (Photos: Beth K. Gugino).

Black rot on brassica crops continues to be reported. Once symptoms develop management strategies are limited to reducing spread to other plants through sanitation and copper-based protectant fungicides. **Alternaria leaf spot** is also still problematic. Some of the more effective fungicides include Priaxor (FRAC group 7 + 11), Switch (9 + 12), Quadris Top (3 + 11), and Endura (7). Luna Experience is another option for brassica leafy greens. It is important to check the label for your specific brassica crop.

Bacterial spot is showing up on pumpkins close to harvest. The fruit were likely infected much earlier in the season when the bacteria on the leaves were splash dispersed onto the fruit. The bacteria colonize the lenticels and other openings in the fruit and once they reach a high enough population, symptoms will begin to develop. **Cucurbit powdery mildew** is also running rampant. In fields that are severely infected with powdery mildew consider dropping back to a protectant program and focus on protecting the handles. There is a greater chance of fungicide resistance developing the larger the pathogen population is that is exposed to the active ingredient. **Reports of cucurbit downy mildew** are declining but that does not mean it is not around. As the fruit become more mature downy mildew becomes less likely to result in reduced yield. It is important to remember that cucurbit downy mildew will not survive once the plant tissue is dead so it will not survive over winter in the soil and be an inoculum source for the subsequent season.



Severe powdery mildew infection on a pumpkin leaf (Photo: Beth K. Gugino).

Rhizoctonia was confirmed on Brussels sprouts. On younger plants it causes wirestem which typically leads to plant death as a result of lesions that girdle the stem. It can also cause damping off in emerging seedlings and bottom rot of cabbage. The pathogen has a very complex pathogen population structure so the specific anastomosis group (AG) determines the specific host range with some broadly affecting lots of different vegetables and others preferring specific types of crops like cole crops. The disease is favored by warm, moist soils as well as high soil nitrogen which is common after a legume crop or cover crop. In-furrow or directed applications of Moncut or Omega are reported to provide good control while Quadris, Quadris Top, and Endura provide some control. Short rotations between cole crops can increase potential disease severity because Rhizoctonia is truly soilborne and inoculum level decreases between seasons without a host.



Lower stem discoloration and girdling as a result of Rhizoctonia infection on young cauliflower plants (Photo: Beth K. Gugino).

On the insect front, we have seen outbreaks of **Harlequin bugs** and **whiteflies** in cabbage, kale, and other cole crops. Both of these insects can be managed with pyrethroid or neonicotinoid insecticides but applications must be made early. In organic production, pyrethrins may provide some control of Harlequin bugs while azadirachtin products provide whitefly control. Harlequin bugs are black and orange as both nymphs and adults, and their feeding results in white patches on leaves. Eggs are black and white in color and barrel-shaped, laid in clusters on the underside of leaves. Both pests overwinter in plant residue of the target crop or weedy hosts, so post-harvest sanitation is an important cultural tactic to reduce damage next year.



An adult harlequin bug on a broccoli leaf (Photo: Karly Regan).

Pumpkins have continued to host **spotted and striped cucumber beetles**, as well as **aphids**. Spider mites have been increasing in greenhouse and tunnel production.

Continue to scout for **Allium leafminer** by looking for rows of small white dots near the highest point on leaves (pictured right). The fall generation of this pest emerges as nights cool down for the season and can last 5-7 weeks. If not using row covers, consider applying a systemic insecticide along with a spreader-sticker surfactant during the period of adult flight and shortly after to control larval feeding.



Oviposition marks by Allium leafminer will appear as a row of small white dots along a leaf, often near the tip or at the highest point on a bent leaf (Photo: Karly Regan).

BERRY CROPS

Spotted wing drosophila on fall-bearing brambles and day-neutral strawberries is a concern right now, and broad-spectrum insecticide sprays for its control will still be needed for at least the next few weeks or until harvest is completed.

With cooler damp conditions occurring, reports of **leaf spots on brambles** are continuing to come in, and **late leaf rust on red or black raspberries** is also being seen. Fungicides in categories 3 and 11 will help with managing these diseases. This is also the time of year when certain leaf diseases (common leaf spot on mainly June-bearers, powdery mildew on day-neutrals) tend to increase on strawberries.

Botrytis (gray mold) is being seen in field-grown fall-bearing raspberries. Effective products allowed for use on brambles include Switch, Elevate, and Ph-D or Oso with a 0-day PHI, and Luna Tranquility with a 1-day PHI. Be sure to rotate chemical classes.

Since several different cane diseases had been seen in blueberries this year, it may be helpful to plan on a fall cleanup application of lime sulfur, applied when the leaves have just fallen from the plants or shortly afterwards. Not all lime sulfur products are labeled for this timing, and use rates vary with the product, so please consult your chemical dealer for assistance in finding a product that will work for your situation.

Growers of both blueberries and brambles may want to plan on a delayed-dormant lime sulfur application next spring. Many diseases cause lesions on the canes from which spores are produced in the spring, and lime sulfur will help to decrease the amount of inoculum produced from these lesions.

Vegetable Disease Updates

Beth Gugino, Penn State Extension Vegetable Pathologist

GENERAL UPDATES:

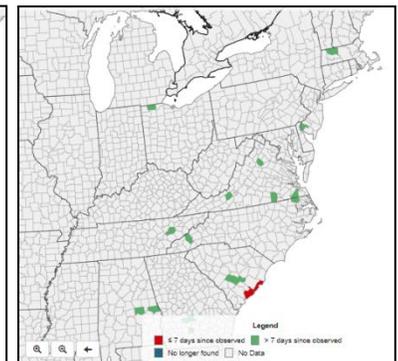
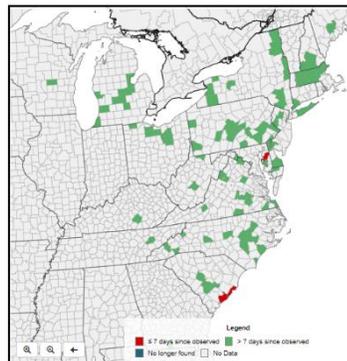
- Although there have been fewer new reports of **downy mildew on cucurbits** this past week that does not mean the disease is no longer active. Later season crops especially greenhouse or high tunnel cucumbers should continue to be scouted regularly and actively managed for downy mildew. Downy mildew has yet to be confirmed in PA on hosts preferred by clade 1 of the pathogen which includes jack-o-lantern pumpkin, summer squash, winter squashes and watermelon but there are several reports in the surrounding states. In PA, downy mildew has been confirmed in western PA on cucumber in Washington Co. and cantaloupe in Mercer Co. and on cucumber in Adams, Cambria, Centre, Huntingdon, Mifflin, Dauphin, Lehigh, Juniata, Snyder, Lancaster, Berks, Bucks, and Delaware Co. If you suspect cucurbit 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. For the latest reports and forecasts check out <https://cdm.ipmpipe.org>.



Phomopsis invading a new blueberry cane (Photo: Kathy Demchak).



Anthracnose lesions on a black raspberry cane (Photo: Kathy Demchak).



As of 9/14/2022, reports of downy mildew on cucumber and cantaloupe (left) and all other cucurbits (right) from the cdm.ipmpipe.org website.

- Late blight was confirmed in two commercial potato fields in Michigan** in early September. To minimize disease spread and larger area impact, the infected fields were vine-killed. Once the plant tissue is dead so is the pathogen. The isolates are in the process of being genotyped. Cool fall conditions and long overnight dew periods are ideal for the development of late blight both in the field and high tunnel. 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.

We are also always interested in a sample to genotype. For over the past decade, US-23 has been the predominant genotype affecting both tomato and potato in the northeastern and mid-Atlantic regions of the U.S.

- With the cooler temperatures, be on the lookout for **Botrytis gray mold in late season**

tomato high tunnels. Although high tunnels provide direct protection from rain, high relative humidity and dew can still provide the moisture necessary for disease development. Gray mold affects many different types of vegetables and ornamentals so there are many potential sources of this pathogen.

It easily grows on weakened or senescing (dying) plant tissue such as old flower blossoms or leaf litter however, it can still cause lesions on the leaves and stems. Foliar lesions can be confused for late blight since both are irregular in shape however gray mold will develop more of a concentric ring pattern and the fuzzy growth (sporulation) is darker and grayer in color and can develop on both the upper and lower leaf surface as well as the surface of stem lesions.

Stems can become girdled and break and foliar symptoms can become severe enough to cause defoliation. The fruit can become infected from dying flower petals that hang on as the fruit develop. These

lesions are whitish in color, very soft and watery and typically develop near the stem end. This is in complete contrast to late blight that causes dark-brown greasy firm lesions on the fruit.



Irregular zonate lesions characteristic of Botrytis gray mold. Dense gray sporulation can often be seen on all symptomatic surfaces under very humid conditions. Photo credits: Beth K. Gugino.

For gray mold, general sanitation is important since it is a very good saprophyte. Also maximizing and maintaining good air circulation through cultural practices. Disease development is favored by temperatures from 64 to 75°F and typically develops on more mature plants that have dense canopies. Foliar applications of products such as Scala (FRAC code 9, 1-day PHI), Botran (FRAC code 14, 0-day PHI), and Fontelis (FRAC code 7, 0-day PHI) will help manage the disease and are labeled for use in greenhouse (and high tunnel) tomato production.

- This past season despite the dry weather, issues with **bacterial canker on tomato** were reported in several regions of the state. If bacterial canker was a problem on your farm this year, now is the time to think back through the production season while it is fresh in your mind and identify points in the crop production cycle where disease management could be improved. Managing for bacterial diseases starts with the seed and ends post-harvest – it requires a season-long approach. As you clean up from this season remember that wooden stakes can harbor the bacteria even when exposed to freezing temperatures overwinter. Therefore, stakes from symptomatic fields should not be used again for the production of solanaceous crops like tomato and pepper. Stakes from asymptomatic fields should be sanitized before use again



Marginal necrosis characteristic of bacterial canker on tomato. Photo credit: Beth K. Gugino.

either by power washing and soaking in a sanitizing solution like sodium hypochlorite, Oxidate, Zeritol, etc. or subjecting them to high temperatures through kiln drying or steaming. Bacteria are more susceptible to hot rather than cold temperatures. Also, this winter when planning crop rotations, allow 3 to 4 years between tomato/pepper crop to facilitate the decomposition of crop residue. The bacterial canker pathogen can also be seedborne so make sure that you are sourcing high quality seed from a reputable source and/or purchasing transplants from a supplier who is aware of the disease and implementing a good greenhouse IPM program. These recommendations along with strict sanitation practices in the high tunnel and/or field can help with reducing potential losses in the future.

Clinic Corner: Findings from the Penn State Plant Disease Clinic

Jennie Mazzone Penn State Research Technologist and Assistant Diagnostician

SUBMITTING DIGITAL SAMPLES TO PLANT DISEASE CLINIC

Did you know that you can submit photos to the [Penn State Plant Disease Clinic](#)? Photos can accompany a physical sample being sent to the clinic or submitted independently without a physical sample. Make sure to include a completed [Specimen Information Form](#) when submitting photos. Email the form and digital images to plantclinic@psu.edu. Printed photos can be mailed to:

Plant Disease Clinic
The Pennsylvania State University
220 Buckhout Lab
University Park, PA 16802

Please provide several photos of the site/field at-large and in-focus, close-ups of the plant part(s) affected. The best photos are those that provide context. For example, receiving this photo along with a physical sample of the affected plant provided the context needed to make an herbicide injury diagnosis. To the left is a great photo showing ornamental plant damaged by contact herbicide (Photo credit: Tosh Mazzone, Penn State). Photo shows plant death in areas where herbicide was improperly applied.



We do NOT want blurry photos or photos which we cannot see symptoms (pictured right; Photo credit: Jennie Mazzone). Blurry photos are not helpful in diagnosis. Especially when taking pictures with your phone, be sure to check the clarity of the image before hitting send in an email.



Long-distance photos are also not helpful if they do not provide context or show symptoms (Photo credit: Jennie Mazzone, Penn State).

If you have further questions regarding submitting photos or samples, check our [Plant Disease Clinic website](#), which has additional instructions. Your local extension office may also be able to answer your questions. Contact the Clinic for all other questions, plantclinic@psu.edu or 814-865-2204.



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