PENNSYLVANIA VEGETABLE MARKETING & RESEARCH PROGRAM

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Pennsylvania Vegetable IPM Weekly Update

July 29, 2020

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 Update

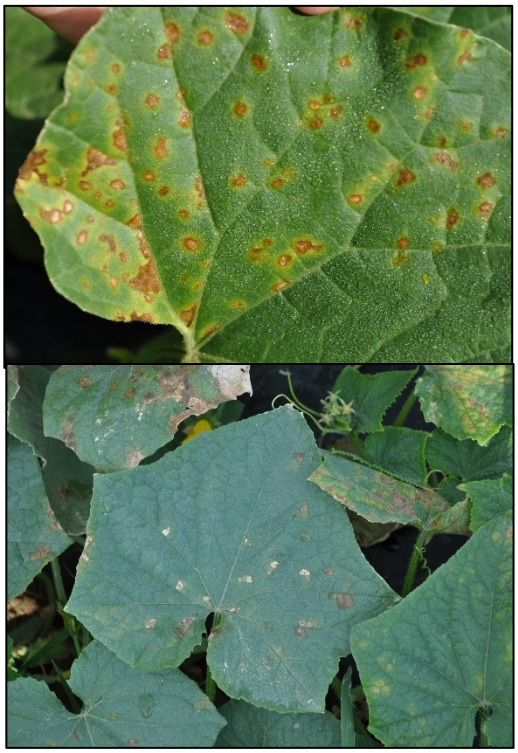
Beth Gugino, Extension Vegetable Pathologist, Penn State University

General Updates:

- There are **no reports of late blight** on tomato or potato in the mid-Atlantic region however, there was another report of late blight on tomato in North Carolina this past week. Daytime temperatures have been too hot however as we get later into the season, cooler nighttime temperatures and longer dew periods can be favorable for the disease. 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.
- Be on the lookout for **downy mildew on basil**. As we get later into the growing season, it is not uncommon for basil downy mildew pressure to increase. There have been several confirmed cases in the region including in southeastern and south-central Pennsylvania. There are a number of effective fungicides including Ranman, Revus, and the phosphorous acid fungicides although these are not labeled for greenhouse plants for retail sale.

Cucurbit Downy Mildew Confirmed on Cucumber in Pennsylvania

This past week, there were multiple confirmed reports of **downy mildew on cucumber in Pennsylvania** in commercial fields in Blair, Lancaster, and Chester counties as well as our sentinel monitoring plot at SEAREC in Lancaster county. There have also been additional reports on cucumber in the surrounding region in New York, Ohio, Maryland, and Massachusetts. The closest reports on hosts other than cucumber are cantaloupe in North Carolina and butternut squash in Tennessee. At this time all growers should be actively managing for downy mildew in cucumbers using target fungicides on a weekly basis and at least using protectant fungicides on cantaloupe. The strain of the pathogen that affects cucumber can easily move into cantaloupe. Symptoms of downy mildew on cantaloupe are not as angular as on cucumber and butternut squash and have a darker boarder. Both will still have dark purplish-gray sporulation on the underside of the leaves. It is also recommended that once you are done harvesting a cucumber field, the crop should be destroyed by either disking under, mowing or applying a burndown



Downy mildew symptoms on cantaloupe (top) and cucumber (bottom). Photo credit: Beth K. Gugino.

herbicide to prevent it from being a source of inoculum for nearby crops. Once the plant tissue is dead, so it the pathogen. If you suspect that you may have downy mildew, please let me know by email at bkgugino@psu.edu or by phone at 814-865-7328 or contact your local Extension Office.

Cucurbit Powdery Mildew is Also on the Rise

Protectant fungicides will manage the disease on the upper leaf surface results in chlorotic lesions and then white powdery lesions on the underside of the leaf (left). Severe powdery mildew symptoms on pumpkin (center). Use of a targeted fungicide when the leaves look like this will lead to fungicide resistance. Powdery mildew infected pumpkin handle. Protecting the pumpkin handles towards the end of the season is important to maintain marketability (right). Photo credit: Beth K. Gugino.

Similar to downy mildew on cucurbits, powdery mildew does not survive overwinter in the mid-Atlantic or Northeast regions but rather moves upward from the southeast along the east coast on weather fronts and as cucurbit production increases throughout the season. Aside from cucumbers which are resistant, we annually have to manage powdery mildew on crops such as pumpkin, summer squash, zucchini and winter squash. In years with low disease pressure, host resistance can reduce our reliance on fungicides to manage the disease by both delaying its development as well as reducing severity. In other years, fungicides become a primary in-season management tool and they are most effective when initiated at the onset of symptoms (one powdery mildew colony/spot on 45 to 50 leaves). It is recommended that the most effective fungicides be used early in the season to keep disease pressure low and reduce potential development of host resistance and then as the fruit mature and you are less concerned about maintaining a healthy crop canopy, switch to a fungicide program based on protectants and for pumpkins direct the applications to protect the handles.

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 include Torino 0.85SC (FRAC code U6), Vivando 2.5SC (U8), Luna Experience 3.34SC (3 + 7) and Quintec 2.08SC (13). These are best used when alternated with products such as but not limited to Fontelis 1.67SC (7), Procure 480SC (3), tebuconazole (3), Inspire Super 2.8F (3 + 9), Pristine 40WSP (11 + 7), Aprovia Top 1.62EC (3 + 11) and Rally 40WSP (3) or with micronized wettable sulfur 80W (M2). 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, 2019 Fungicide Resistance Management Guidelines for Vegetable Crops and 2018 Cucurbit Downy and Powdery Mildew Efficacy Table 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 Tritek (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.

PA Vegetable and Berry Current Issues July 28, 2020

General conditions and observations: Much of the state has remained dry with spotty isolated thunderstorms. In some cases, growers have had to supplement their farm stands and markets produce from the auctions due to irrigation limitations. As a result of the drier weather, issues with insect pests have been the predominant concern for growers and there have been reports of occasional pests causing damage in select fields.

Important Notice: Nationwide there have been reports of residents receiving packages labeled as jewelry but instead contain unsolicited unlabeled plant seeds. These seeds could be potentially very harmful to PA agriculture industry and ecosystem. They could contain plant diseases or be weeds and invasive plants and have been tied to an online scam called "brushing". If you received a package of this type, do not plant or discard them and contact the U.S. Department of Agriculture's confidential Antismuggling Hotline at 1-800-877-3858 or by email at SITC.MAIL@aphis.usda.gov for further instructions.

FIELD PRODUCTION UPDATE

Downy mildew has been confirmed on cucumbers in Blair, Lancaster, and Chester Counties in PA this past week. Other diseases being reported in the field include **bacterial spot of pepper**, **bacterial canker,** and **early blight in tomato**, as well as **pith necrosis** (a bacterial disease) **in tomato** and **powdery mildew on cucurbits** and **anthracnose on cucumber** and **mature tomato fruit**.

Bacterial leaf spot on older pumpkin leaves (Photo: Meg McGrath, Cornell University).

Swede midge has made its way to Pennsylvania. First confirmed in New York about 20 years ago, it has spread to additional states and Canada, and now to Bradford County. Larval feeding induces changes in plant physiology, resulting in distorted growth. More information is here: https://extension.psu.edu/swede-midge-now-in-pennsylvania. Several insects that commonly occur in tomatoes, but typically not in large enough numbers to be a big concern, are showing up in high numbers. These include **Colorado potato beetle**, **flea beetles**, and **tomato hornworm**. In most years, the parasitoid Cotesia congregate, keeps hornworms to low levels, but this year we have had damaging rates of defoliation by hornworms. The second generation of **Striped Cucumber Beetles** are abundant, and their relatives, the **Spotted Cucumber Beetle**, and adults of the **Western Corn Rootworm**, are all active. They are most easily found in squash/pumpkin flowers. The **squash bee** is also in those flowers. Males stay with the flowers overnight, while females stay in their nests. Nests are made in the ground, about pencil-sized width, sometimes with the excavated soil visible near the entrance hole. **Squash bug** is active, in all life stages. Squash bug transmits a pathogen that causes yellow vine disease, which is showing up in some fields. The **proportion of the population of corn earworm that is showing resistance to pyrethroids** tends to build as the season progresses. Southeastern Virginia is already reporting rates of 40%, which is high for this time of year. Pyrethroids also are known for having problems in hot weather.

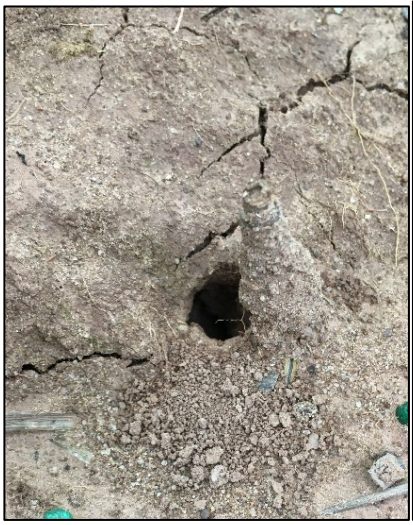
Anthracnose on tomato fruit (left), anthracnose on cucumber leaves (center) and bacterial canker marginal necrosis on tomato leaves (right) (Photos: Beth K. Gugino).

A crop of ground cherry, also known as tomatillo, is being heavily damaged by what we suspect is ***Heliothis subflexa***, a relative of corn earworm.

Tomato hornworm, with cocoons of an insect parasitoid, Cotesia congregata, attached. Photo: T. Kuhar

Above:
Possible Heliothis subflexa damage to ground cherry. (Photo: K. Baken).

Left:
Broccoli plant not producing a head due to swede midge. Photo J. Esslinger.



Squash bees in a Cucurbit flower (left), entrance of squash bee nest in soil (middle) (Photos: John Eslinger). Yellow vine decline in pumpkins, on a plant heavy feeding by squash bugs (right) (Photo: S. Fleischer).

BERRY CROPS

Disease incidence continues to be relatively low in much of the state where there are dry conditions. All berry crops should be irrigated to the extent possible to size the crops still being produced this year. Also remember that next year's strawberry crop will be dependent on strawberry growth that occurred this summer, whether the plantings are new ones established this year, or are older ones that have been renovated, so be sure not to forget about your berry plantings.

Two-spotted spider mites, thrips, tarnished plant bugs, and potato leafhoppers are present in berry plantings, and damage from them can accrue if plant growth has slowed down due to heat and drought stress. Growers should continue to watch for **spotted wing drosophila** in late varieties of blackberries and blueberries, and primocane-fruiting raspberry, blackberries, and day-neutral strawberries.

Raspberry caneborer damage occurs at this time of the year – watch for wilted tips on brambles and look for two rows of punctures. An egg would have been laid between them in the stem. Clip stems, watching for a hole in the center, which indicates that the larvae may have hatched and migrated to a lower position in the cane. If this occurs, continue to cut the cane lower until the stem in solid.

Caterpillar pests appear to be present in higher-than-usual numbers this summer. These include yellow-necked caterpillar, which can quickly defoliate individual bushes, and bagworms, both of which have been found in blueberry plantings. Populations may be limited to a few bushes, so hand-removal may be all that is needed.

Potato leafhopper feeding causing yellowing and leaf distortion on strawberries and raspberries. (Photo: K. Demchak).

Raspberry caneborer oviposition wounds and a wilted cane tip indicate that a borer egg or larvae is presented in the cane. (Photo: K. Demchak).

Bagworm feeding on a raspberry leaf. (Photo: K. Demchak).

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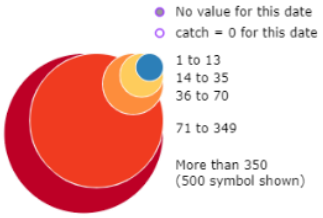
Sweet Corn Insect Pest Monitoring

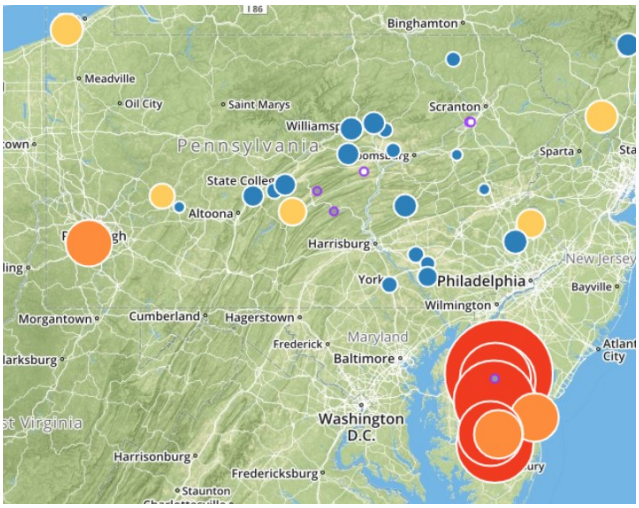
Shelby Fleischer, Extension Vegetable Entomologist, Penn State University

Interactive Maps with Google style view at http://www.pestwatch.psu.edu/sweetcorn/tool/index.html

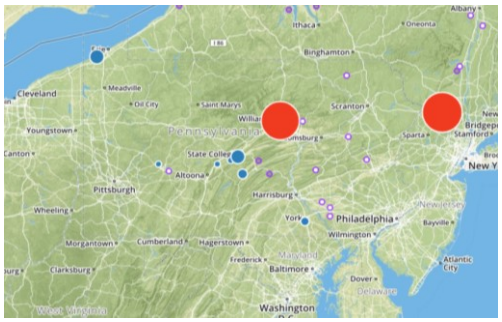
Corn Earworm

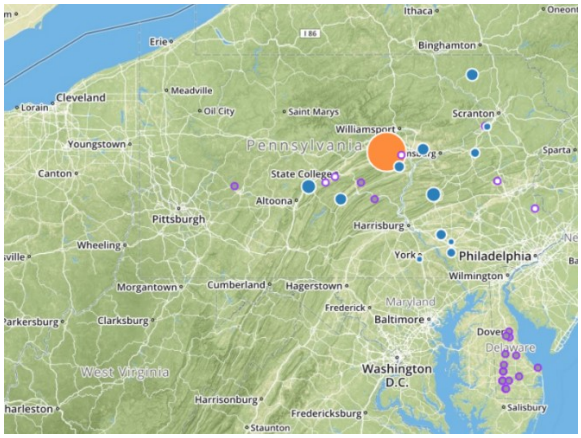
Corn earworm (CEW) catch range from 0 to 48. Of the 28 sites with weekly average estimates from this week or last, 8 exceed spray thresholds. Tasseling and silking corn is very attractive to CEW.





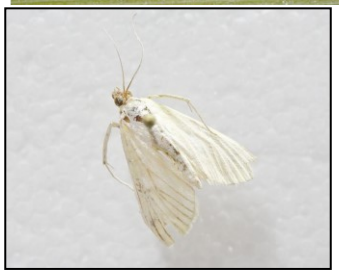
CEW counts range from low to moderate, and multiple sites have shown recent increases. Circle color aligns with CEW thresholds; size is proportional to catch.





European corn borer (ECB) Most sites have negligible counts. One site is showing high counts for the New York (E) strain, which may be non-target captures of the **carrot**

FAW is showing isolated hot spots in trap catch and larval damage. **FAW makes large, ragged feeding patterns (bottom).**



European corn borer (top) compared to **carrot seed moth** (bottom).

TRAP COUNTS - Moving average for the last 7 days. The catch/number of nights trapping, divided by the number of nights with data, times 7. Weeks where all the average-catch-per-night values are nulls are treated as if no data exist for that week. Gray = no trap for that site. Pink-to-orange are sites above threshold levels.

		CEW			ECB			FAW		
County	Trap Name	15-Jul	22-Jul	29-Jul	15-Jul	22-Jul	29-Jul	15-Jul	22-Jul	29-Jul
Blair	Tyrone	0	3	10	0	0	7	0	0	2
Bucks	Bedminster	---	3	18	---	0	0			
Centre	State College	25	15	11	9	---	0	2	5	11
Centre	Rock Springs	2	4	6	19	---	0	2	1	2
Clinton	Loganton	8	6	11	8	14	51			
Erie	Fairview	10	14	12				1	3	1
Erie	Lake City	14	6	23				5	4	11
Indiana	Brush Valley	2	3	3				0	0	0
Indiana	Creekside	24	---	14	0	---	---	0	---	2
Juniata	Port Royal	18	15	---	30	28	---	0	4	---
Lackawanna	Ransom	0	2	0	3	7	2			
Lancaster	Landisville	19	26	6	1	5	4	0	0	0
Lancaster	Neffsville	11	8	5	0	2	1	0	0	0
Lancaster	New Danville	14	10	9	0	4	3	0	0	0
Lehigh	Germansville	3	2	3	0	0	0	0	0	0
Luzerne	Drums	0	0	3	0	0	3	0	0	0
Luzerne	Plains	---	0	0	---	0	0			
Lycoming	Linden	0	12	---				0	77	---
Lycoming	Montoursville	3	11	---				0	0	---
Lycoming	Muncy	9	5	---				0	0	---
Mifflin	Belleville	40	25	17	4	6	5	1	5	5
Montgomery	Souderton	---	10	13						
Montour	Washingtonville	10	3	5	4	1	5			
schuylkill	Tower City	1	8	12	0	0	7	0	0	0
Susquehanna	Montrose	1	5	---	0	5	---	0	0	---
Union	New Berlin	1	1	0	1	2	4			
Union	Lewisburg				0	0	0			
Washington	Venetia	54	29	48						
York	York	---	11	6	---	0	1	---	0	4

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		Catch/Week	Spray Frequency
Very very low	1-13	7 – or no spray		<15	7 – or no spray
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			