



PENNSYLVANIA VEGETABLE MARKETING & RESEARCH PROGRAM

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Pennsylvania Vegetable IPM Weekly Update

September 15, 2021

This is the last IPM Weekly Update for the 2021 season. Thank you to Penn State Extension Specialists for providing the content for these Updates each week.

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

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General conditions for September 14: Parts of the state experienced significant rainfall as the result of the remnants of Hurricane Ida passing over the region with rainfall totals over 7 inches in locations in eastern Pennsylvania. Some growers lost fields completely to flooding while in others the rain led to significant plant decline and loss of marketable produce. This was on top of an above average warm and wet August across part of the state. For more information on the impact of Tropical Depression Ida on the region check out this article from the Northeast Regional Climate Center (<https://www.nrcc.cornell.edu/services/blog/2021/09/03/index.html>).

FIELD and HIGH TUNNEL PRODUCTION

In general, new reports of **cucurbit downy mildew** are declining as more crops are reaching maturity and the end of the season approaches. The closest reports of downy mildew (pathogen Clade 1) on pumpkin, butternut squash, and/or acorn/summer squash are in Ohio and Massachusetts. Continue to manage **powdery mildew** until 7 to 10 days before harvest to protect the handles and target applications. Powdery mildew will cause the handles to become brown and shriveled thus reducing marketability.

There have been several reports of **Plectosporium blight** on pumpkin, but it can also affect summer squash and zucchini. This fungal disease causes very distinct small diamond- or spindle-shaped lesions on the plant stems, petioles, and leaf veins as well as small white lesions on the fruit. It can also cause less distinctive yellow-tan lesions on the leaves. Under moist conditions and moderate temperatures, the lesions can coalesce together reducing overall marketability of the fruit. The lesions on the fruit can also be an entry way for opportunistic soft-rotting bacteria that can lead to complete fruit collapse as was the case in one field. Some other reports were coming from fields that were being actively managed with fungicides for powdery and downy mildews. The fungicides applied for managing powdery mildew will help manage *Plectosporium* blight however they need to be applied weekly and with a high volume of water to get good coverage under the plant canopy.

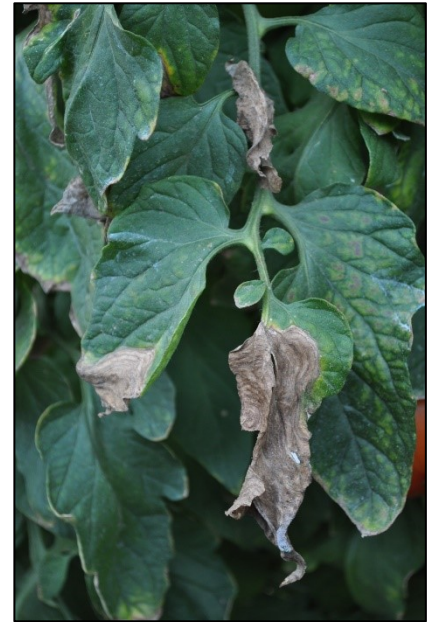
Over the past three years, this disease has become increasingly more common and should become a regular part of a scouting program. Chlorothalonil alternated with a strobilurin-type fungicide such as Quadris Top (FRAC 3+11), Cabrio (11), Flint (11) or Pristine (7+11). Consecutive applications of FRAC 11 containing fungicides should not be applied.



Diamond-shaped lesions caused by Plectosporium blight on a pumpkin handle. (Photo: Jeff Stoltzfus, Penn State)

There continue to be reports of **cucurbit fruit rots** both in the field and post-harvest in the bins. Although it is too late for this season, getting an accurate diagnosis on what is causing the fruit rot will help in developing a scouting and integrated management program for the next season. Fruit rots can be caused by a wide array of pathogens and can be further exacerbated by insect feeding, storm damage, and damage during harvest. Preventative efforts that improve soil drainage and direct contact between the fruit and soil can be beneficial but require prior planning.

This fall as the temperature drops, dew periods extend, and the skies turn cloudy on the lookout for **Botrytis gray mold (and late blight) in high tunnel tomatoes**. 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: 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.

In regions of the state which had more significant rainfall, there have been reports of **bacterial canker on tomato** (as well as other bacterial diseases). If it was a problem on your farm this year, now is the time to reflect on 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 is 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 the production of solanaceous crops like tomato and pepper. Stakes from asymptomatic fields should be sanitized before use again either by power washing and soaking in a sanitizing solution like sodium hypochlorite, Oxidate, Zeritol, etc. or subjecting them to high temperatures this through kiln drying or steaming. Bacteria are more susceptible to hot rather than cold temperatures. Also, winter when planning crop rotations, allow 3 to 4 years between tomato/pepper crop to facilitation the decomposition of crop residue. These couple of recommendations along with strict sanitation practices in the greenhouse and field can help with reducing potential losses in the future.



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

Although we've been having high rates of trap capture of both **corn earworm (CEW)** and **fall armyworm (FAW)**, in plots where damage rates were tracked according to species, most of the damage to ears of sweet corn seem to be coming from CEW. FAW has been causing high rates of damage in vegetative situations, including turf, soybeans, alfalfa, and areas vegetated for erosion control such as well-heads.

The fall generation of **Allium leafminer (ALM)** is due to appear. **ALM** spends the summer as pupae, which will emerge as adult flies and begin making egg-laying scars on leeks, onions, garlic, scallions and ornamental alliums. In past years, our earliest detection of the fall adults was the last week of September. Leeks and scallions tend to get the most damage, and there have been reports of extensive damage to garlic as well. Row covers or well timed sprays during the adult flight (about 5-7 week time span) has provided good control. In plots with weekly applications, the highest and most consistent control occurred using foliar applications of dinotefuran (Scorpion), cyantraniliprole (Exirel) and spinetoram (Radiant). Spinosad (Entrust) also provided very good control and is OMRI-labeled. Preliminary data suggest fewer applications (3-4, as opposed to 5-7, starting about a week after first egg-laying marks are detected) may be as effective. Surfactants are recommended for any sprays on alliums due to their waxy leaves.



Allium leafminer adult and egg-laying scars. (Photo: B. Lingbeek)



Tomato pinworm. (Photo: J. Hyden, Bugwood.org)

Tomato pinworm is showing up in tunnel and field settings. Caterpillars make a blotch leafminer, and will also tunnel into fruit. This species is not expected to overwinter in PA, but can arrive on southern transplants, and possibly they do overwinter in greenhouse settings. Reproduction of isolated populations, if caught early, can be limited using pheromone disruption (NoMate TPW Spirals, Checkmate TPW).

Both **broad mites** or **cyclamen mites**, and **two-spotted spider mites**, are showing up in multiple crops. Broad or cyclamen mites are very small, elongated mites that are rarely seen. In peppers they can cause leaf cupping, distorted buds, and russetting. Spider mites are much larger mites, that feed by puncturing epidermal cells, resulting in stippling patterns on leaves. We are also seeing **aphid-transmitted virus** in pumpkin at levels that are higher this year than in past years.

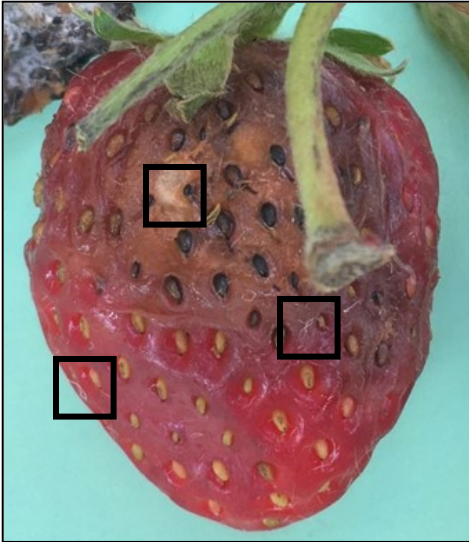


Leaf cupping, bud distortion, and russetting caused by broad or cyclamen mites in peppers. (Photo: Lee Stivers)

BERRY CROPS

Conditions of moderate temperatures and high humidity are perfect for spotted wing drosophila (SWD), and SWD numbers have increased tremendously lately. Fall raspberry and day-neutral strawberry fields are both being infested. Two signs that day-neutral strawberry fruit may have spotted wing drosophila are that it "melts" even though temperatures are cool, and you may see an assortment of fruit rots moving in, including some typically minor ones. Oviposition wounds may allow fungi to invade the wounded tissue, or perhaps SWD "inoculates" the fruit when puncturing it to lay eggs. Regardless of the mechanics of what is happening, it appears that fruit that is infested with SWD has a greater variety of fruit rots. This may cause growers to think that they have an oddball disease problem when the root of the issue may actually be SWD presence. Ratings of how well pesticides work on SWD in small fruit, and a table of which products can be used on which berry crops can be found here: <https://extension.psu.edu/spotted-wing-drosophila-a-2021-update-for-berry-growers>

Anthracnose fruit rot incidence is fairly high in some day-neutral fields now, probably due to wet conditions along with relatively warm temperatures. In other fields, anthracnose incidence is extremely low to nonexistent. Dr. Menjun Hu at the Univ. of Maryland is finding a fairly high incidence of resistance to category 11 fungicides in anthracnose isolates collected from mid-Atlantic area and surrounding states, almost regardless of location. Resistant strains have likely been building up slowly over the last couple of decades, as category 11 fungicides have been used for management of a



The fruit is infected with anthracnose, but also has soft spots caused by spotted wing drosophila infestation. Note the short white breathing tubes which are attached to eggs, and the outline of an older fly larvae just below the fruit surface. (Photo: K. Demchak)

variety of strawberry diseases for about that long. Any fungi that were on these plants were exposed to the treatments, regardless of what you were spraying for. Using tank mixes is going to be even more important in the future than it had been in the past. See this article for more info on how to best manage this disease: <https://extension.psu.edu/strawberry-anthracnose-better-understanding-and-management> .

Fall-planted strawberry plugs should be monitored extremely closely for signs of foliar disease and crown or root diseases, as there are a number of issues that may be present. See this article for diseases that you should be watching for, along with photos and fungicide recommendations: <https://extension.psu.edu/disease-management-recommendations-for-fall-planted-strawberry-plug-plants> .