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Pennsylvania Vegetable IPM Weekly Update

June 10, 2021 This is the first Update of the 2021 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.

# Vegetable and Berry Current Issues

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## **GENERAL CONDITIONS**

Some growers are experiencing transplant shock and sunscald on the young stems resulting from planting into hot plastic in the unseasonably warm weather. It is important to harden plants off between moving them from the greenhouse to the field and to keep the edge of the plastic from contacting the tender stem. Leaf roll, a physiological disorder, is already being observed in some tomato fields along with high thrips pressure in a number of crops

as a result of the higher temperatures. While other growers have experienced localized severe storms that damaged some crops like onion/leeks and led to wet fields and concerns about Phytophthora blight on peppers and cucurbits. Weather across

Water-soaked lesion caused by a bacterial pathogen on a young onion transplant leaf that extends towards the base of the plant. Photo: B.K. Gugino.

the region will continued to remain unsettled but cooling and becoming less humid towards the weekend. Average temperatures across PA for this time of year range from mid-70s to low 80s°F. For more information check out Penn State Weather World (<u>https://weatherworld.psu.edu</u>).

## **ONIONS and other ALLIUMS**

**Bacterial diseases** have been observed in some fields. Symptoms can be caused by a number of bacterial pathogens. Some will cause a general soft rot of the outer developing scales while others will move from the leaf into the neck and eventually the onion bulb as the disease develops. At this time mancozeb tank mixed with copper is the primary tool recommended to reduce spread from rain splash. Once the bacteria are inside the plant, no treatment will be effective. Copper can cause phytotoxicity on onion leaves especially when sprayed after a period of cloudy weather. Bacterial diseases are favored by hot wet/humid conditions and can affect the plants at any growth stage.

#### FIELD PRODUCTION

**Downy mildew on cucumber and cantaloupe** is currently reported as far north as central coast of South Carolina with previous reports on cucumber and/or cantaloupe in southern Georgia. Although the sources are not close and weather patterns do not favor spread across our region that could quickly shift so knowing what

symptoms to look for and having a fungicide plan of action now are important. In the past 6 years, it has been first reported on cucumber as early as 3 Jul and as late as 22 Aug. Keep in mind that cucurbits are susceptible to downy mildew at any stage of growth from seedlings to mature plants.





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

*Poor emergence and stand establishment characteristic of potential pathogen issues with the seed tubers. Photo: Tom Ford.* 

Currently there are no reports of **late blight on tomato or potato** in the region. The wet weather has led to some issues with poor stand establishment in select potato fields where seed tubers fail to emerge. It is important to purchase high quality seed and to inspect seed for irregularities prior to planting. Disease such as **blackleg** caused by Dickeya and Pectobacterium spp. as well as late blight can come onto the farm in infected seed lots. Both diseases can be exacerbated under wet field conditions although blackleg and late blight prefer warmer and cooler temperatures, respectively.



Thrips are very small insects (< 2mm in length) with mouthparts that punch into plant cells and suck out the cell contents ('punch-and-suck' feeding, sometimes called 'rasping' feeding. Feeding results in a 'silvering'of the leaf tissue. Feeding sites vary amont species but can include both pollen and leaf tissue.

Damage from **thrips** are showing up in lettuce, onions, and multiple other crops, in both hydroponic and field settings. Common species in vegetable crops in our areas include **Onion thrips**, **Eastern flower thrips**, **and Western flower thrips**. Other species (tobacco thrips) are typically more associated with warmer climates, and some species (melon thrips) are invasive into Florida. Additional species (grass thrips) are common in grass, grain, and corn, and will move onto other crops if the grass dries or is mowed. Thrips are also a common problem in greenhouses, feeding on flowers and young transplants.

These species have a wide host range, and some species transmit viruses. Western flower thrips (WFT) overwinter as adults or larvae, eggs are deposited in plant tissue, there are two larval stages (which are the feeding stages), followed by a prepupal and then a pupal life state. The pupal life stages are on or in the soil or ground surfaces, in cracks, or under debris.Development is rapid, and both sexual or parthenocarpic reproduction occurs, so populations can build quickly. Resistance is common. WFT feed on both pollen and leaf

tissue. In greenhouse settings, release of several biocontrols target thrips. Cabbage are blistered, scarred, and bronzed by thrips feeding on leaves; with thrips present, heads are unmarketable. Thrips feed on leaves by puncturing and rasping the outer leaf tissue and sucking the sap as it exudes from the cells. Where many thrips have fed, the discolored areas coalesce to form large brownish, blister-like areas. 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 may also be labelled.



Striped Cucumber Beetle. Photo: N. Sloff.

**Striped cucumber beetles** populations are immigrating into fields. 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 larva 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 to very low, or non-detectable, levels. Very low rates to transplants may also reduce

residues to bees. But soil drench or applications through the drip should be avoided. Among the foliar spray options with neonics, Assail is effective and has a lower bee toxicity. Multiple pyrethroids are also labelled and effective and are not systemic.

**Sap beetle** populations seem to be starting off at higher-than-normal levels. Adults overwinter in wooded areas and protected locations, and then tend to build where adults and larva 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



Sap beetle adult (left, Photo: M. Price) and larvae (above, Photo: Tom Ford)

with both strawberries and sweet corn should try and avoid having a population of sap beetles build up in their berry crop. Compost piles or areas where produce may be discarded are also areas in which sap beetle numbers will increase. 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.

The common **Cabbage White Butterfly** is active and easily visible as a day-flying butterfly. The larvae feed on cole crops, resulting in fairly large holes. A wide range of insecticide modes-of-action are effective, including several that have low toxicity to bees.



Cabbage white butterfly (Photo: GrowingVeg.com

#### **BERRY CROPS**

We had a quiet start to the strawberry disease season, but warm temperatures and increased moisture changed that. **Fruit anthracnose** is present and so is **Botrytis**, sometimes causing berries to soften in the area under the cap where moisture remains. **Angular leaf spot** has been noted in a number of plantings, perhaps increased by the hours of overhead irrigation used for frost protection. This disease causes water-soaked angular spots on infected leaf tissue. The main concern however is that it causes berry caps to turn brown which decreases fruit marketability. Because this disease is caused by a bacterium, fungicides have no effect. Copper products may result in some slight improvement, but it is likely that most of the damage has already been done. Whether it will be worth treating fields with copper at this point depends on how far along harvest is.

Cool dry conditions may have helped to minimize any issues with **Neopestalotiopsis** on strawberries, with only minor symptoms being noted. **Phytophthora crown rot** continues to affect some Flavorfest plantings. It is interesting to note that plant collapse is minimal to nonexistent in a number of fields where Flavorfest was

planted in new ground; the most extensive collapse is in fields that have had multiple crops of strawberries in the past. This serves as a reminder that growers should lengthen rotations between strawberry crops to the longest time possible – with 3 years minimum between strawberry crops, and 5 to 10 years being better.



Angular leaf spot on strawberry leaves. Note angular shape to spots, especially on the lower leaf surface. As with other bacterial diseases, affected tissue can take on a blackened appearance. Photo: Kathy Demchak.



Browning of strawberry caps caused by angular leaf spot. Photo: Kathy Demchak.

Some **mummy berry "strikes"** have been noted in blueberry plantings; these are shoots that wilted and died and a portion of the blossoms may have been blighted and remain attached. It is too late for any control measures to be effective, but if these symptoms are present, be prepared to find some mummified berries this summer.



*Exterior and interior of blueberry fruit infected by mummy berry. Note white fungal mycelium that can be seen when the fruit is cut open. Photos: Kathy Demchak.* 

**Spotted wing drosophila** is present in very low numbers, presumably from overwintering populations. However, it won't be long until their numbers increase, so be prepared to spray very late season June-bearing strawberries if necessary, and of course bramble and blueberry crops as they ripen.

# Vegetable Disease Updates

**Beth Gugino** 

### **General Updates:**

There are currently no reports of late blight on tomato or potato in the region. Tomato and potato plants are susceptible at any point during the growing season if conditions are favorable (cool and wet). The source of the pathogen is typically potato cull piles, volunteer potatoes that were infected last season, and infected seed or transplants. Late blight can not survive in dead plant tissue or in the soil. Last year there were only two confirmed reports of late blight across the region, one in the southwest corner of NY on tomato and potato and one in Lancaster Co., PA on tomato. Both were late in the season in August/September and were the US23 genotype. The most common genotype detected in recent years. If you suspect late blight on your farm please let me know either by email at <u>bkgugino@psu.edu</u> or by phone at 814-865-7328 or contact your local Extension Office.

Several growers have reported issues with poor potato stand establishment where seed tubers fail to emerge as well as poor seed quality. It is important to inspect your potato seed and only plant healthy (asymptomatic) tubers. Source certified potato seed from a reputable supplier. Keep the tags from the seed bags for reference if you run into issues. If purchasing smaller seed quantities, ask the ag supplier for information about the seed source. There are many



Severe late blight foliar and stem lesions on tomato. (Photo credit: Beth Gugino).

pathogens that are seedborne and despite all efforts by the seed potato grower, some lots perform poorly especially when environmental conditions favor diseases like late blight or blackleg/potato soft rot.

Currently cucurbit downy mildew (CDM) has been reported as far north as the central coast of South Carolina on both cucumber and cantaloupe. The current weather patterns do not put our region at risk but keep in mind that any growth stage of the plant is susceptible. Recent research from North Carolina State University has grouped the cucurbit downy mildew pathogen into two clades with one affecting cucumber and cantaloupe and the second clade affecting pumpkin, squash, and watermelon. In the past six years in PA, on cucumber it has been first reported as early as 3 Jul and as late as 22 Aug. On pumpkin and butternut squash, it has only been reported in three of the past six years. So, there are three years when the application of downy mildew specific fungicides would be not be cost-effective. Weekly reports on the status of



*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).* 

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 <u>sign-up or re sign-up</u> 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 <u>alerts@cdm.ipmpipe.org</u>.

This past week downy mildew on basil was confirmed in southern New Jersey on plants being sold at a big-box store.. It is a completely different pathogen from the one that affects cucurbit crops but it can be equally as damaging. For more information on managing basil downy mildew in the greenhouse or field check out this <u>Plant and Pest Advisory Alert from Rutgers</u>.

# Keep an Eye Out for Onion Bacterial Diseases

There are some reports of bacterial diseases in onion fields. The bacteria are easily spread between plants via rain splash and enter the plant through natural openings as well as wounds created from storm damage or thrips feeding injury.

The most characteristic foliar symptom of center rot is one, or more interior leaves that become bleached and collapse. The leading edge of the lesion is often grayish green in color and water soaked as it moves towards the neck of the onion. Eventually the bacteria can move into the bulb causing the associated scale to become discolored while the rest of the onion remains firm. Currently a copper-based product tank-mixed with mancozeb is recommended for in-season management. It will protect the surface of the plant from bacteria that may be splash dispersed



Water-soaked bacterial lesion on a young onion transplant (above). Interior bleached leaf characteristic of center rot on onion cv. Candy (left); (Photo credit: Beth Gugino).



Thrips feeding damage can exacerbate bacterial diseases. Although frequent rain events can knock back thrips populations, it is important to maintain a regular scouting program and use insecticides such as Radiant, as needed.

but will not affect any bacteria that may already be inside the plant tissue.

Thrips larvae are most commonly found in the leaf axil at the base of the plant where they are protected. Increased thrips feeding damage has also been correlated to increased foliar fungal disease problems such as Stemphylium leaf blight and purple blotch in additional to bacterial diseases like center rot. The recent hot weather is ideal for increased thrips pressure.

Penn State is now in year two of a four-year project recently funded by the USDA Specialty Crop Initiative Program title <u>Stop the Rot</u> that involves 12 states that cut across all seven onion growing regions in the US. PA is not the only state to have issues with onion bacterial diseases. It is estimated that bacterial diseases account for more than \$60M in losses annually to the onion bulb industry. A comprehensive survey of five onion fields was conducted in PA last year and another five will be surveyed this year so we will be looking for several grower cooperators. In addition, we will be conducting several field trials in an effort develop better management recommendations. If you suspect you have onion bacterial disease issues or are interested in learning more about the project please contact me by email at <u>bkgugino@psu.edu</u> or by phone at 814-865-7328.

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