UNIVERSITY OF MARYLAND EXTENSION | AgFS Agriculture & Food Systems

Vegetable & Fruit News

A research-based publication from the University of Maryland Extension Team

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Inside this Issue:

Orange Rust is a Bigger Problem Than Usual this Year in Brambles.

By Jerry Brust.

This has been a soggy May. With overcast skies and drizzle almost every day along with cooler than normal temperatures. This type of weather is great for foliar disease problems such as botrytis, but also for a disease called orange rust in brambles. Orange rust begins to appear a few weeks after plant emergence with the lower leaf surfaces becoming covered with blister-like masses of orange aeciospores (fig. 1). The disease is caused by two fungal pathogens that cause systemic infection throughout the blackberry. Infection takes place when it has been wet for more than 12 hours in a day and temperatures are between 43°F and 72°F. The fungus cannot infect if it is hot (85o F) or very dry.

While the telltale sign of this disease are bright orange pustules on the undersides of leaves other symptoms of infection include spindly, stunted, weak shoots that emerge from floricanes, chlorotic misshapen leaves and multiple spindly shoots growing from root buds. Sources of orange rust in established plantings often come from wild brambles along wooded edges, so if you have an established planting and see orange rust be sure to scout the wooded edges along your plantings to identify a possible wild source. There are two forms of orange rust, the one on black raspberry is caused by *Arthuriomyces peckianus*, while the form commonly found on blackberry is *Gymnoconia nitens*. All varieties of black raspberry and many varieties of erect blackberries are susceptible. Red raspberries are immune to orange rust.

Damage from orange rust can be significant. Even though infected plants seldom die, they are weakened and do not produce quality fruit. Consequently, they represent an almost total loss in yield. However, the good news is that the disease is usually sporadic, which helps growers to manage its spread. Rust overwinters on infected leaves on the soil surface and on old canes, so if rust gets established in your field, it will likely persist at low levels through the life of the planting. There are two periods of infection that are important for control, 3-4 weeks in the spring, around the time of shoot emergence, after the last frost, and about 3-6 weeks in the fall, from the time when primocane growth slows until first frost.

Fig. 1 Orange pustules on the underside of bramble leaves indicating infection with Orange rust. Photo by T. Sievers, Blumen Farm

Since orange rust is a systemic fungal disease, management and control is mainly through removing infected plants entirely, including the roots. Once infected, a plant cannot be cured. Remove infected plants as soon as they appear in the spring before they release spores. Remove infected wild *Rubus* plants in the vicinity of your planting (these plants will show the orange pustules most strikingly). Any management practice that encourages air circulation within the canopy such as thinning canes within the row, removing floricanes immediately after harvest and weed management will aid in disease control by reducing the duration of leaf wetness. While using fungicides will not help with already infected plants they will help protect other neighboring plants from initial infection. Fungicides should be applied when the orange pustules are first seen, preferably before they release spores. If the field has a history of orange rust, sprays should be started before blisters appear. The best fungicide options are Rally (myclobutanil) and Tilt (propiconazole). Apply on a 10 to 14-day schedule – use the shorter interval in wet weather.

Apache is a cultivar that is considered to be resistant, or at least tolerant to orange rust, but of late this may not be the case. Other cultivars that have historically had a good tolerance include *Cherokee, Cheyenne, Comanche, Ouachita, and Osage*.

Resources: *Cassandra Swett, Extension Specialist – Berry Pathology, University of Maryland.*

Fireblight Updates – 2024

By Chris Walsh

Fig. 1 Shoot blight on the leader of two-year-old CrimsonCrisp apple tree. Photo by C. Walsh

This year's wet spring, coupled with the increased production of fireblight-susceptible varieties, has caused disease problems for many local apple growers. While fireblight is an indigenous disease, it recently began to increase in its severity.

As we reduced the acreage of tolerant varieties like Red Delicious and Golden Delicious, while planting new blocks with susceptible varieties like Gala and Fuji, fireblight became an important orchard risk.

The precocity of Gala and Fuji and other new varieties, budded onto precocious, size-controlling rootstocks, increased the risk of fireblight. Planting floriferous varieties such as Cripps Pink, Evercrisp and CrimsonCrisp which bloom over an extended period, further increased the risk of blossom blight.

Difficulty controlling blossom blight has led to an outbreak of shoot blight in a number of young Maryland orchards(Figure 1). Growers began cutting out shoot blight during the past few weeks to avoid additional strikes and reduce the chance of losing blighted trees to trunk and rootstock blight.

Chemical control measures focus on the use of bactericides, growth retardants, and activators during the bloom and post-bloom period. To have the greatest effect, growers typically time their applications to infection periods as predicted by computer prediction model programs such as MaryBlyt (now available for download at http://grapepathology.org/maryblyt).

Despite these efforts, growers are still struggling to control Erwinia amylovora, the bacterium which causes fireblight. To gain better control in the future, we will need field-tolerant varieties, better control methods and improvements to fireblight-predictive models.

Fig. 2 . Recently- planted, late-blooming Cripps Pink apple trees. Any rain at this stage risks blossom blight which could infect the leader. Photo by C. Walsh

The Curious Case of the Virus Infected Tomato Fruit

By Jerry Brust. UME

Ben Beale, AgFS educator from St. Mary's County found an odd thing last week. He found in a grower's high tunnel tomato fruit that had the symptoms of virus infection (fig. 1), but there were no foliar symptoms on any of the plants (fig. 2). Some fruit on a cluster had symptoms while other fruit on the same cluster looked perfectly fine (fig. 1B). Ben had the fruit tested and got a fast response from Jill Pollok at the University of Delaware Diagnostic Clinic and it was Tomato Spotted Wilt Virus. The cultivar in question *Big Beef Plus* has TSWV resistance. There could be one or two possibilities for TSWV symptoms showing up in a resistant cultivar and for fruit symptoms but not any foliar symptoms of the virus.

Fig. 1 TSWV infected tomato fruit (A and B) on a plant with TSWV resistance. Notice that photo B has 1 fruit on a cluster with symptoms, but not any other fruit. Photo by Ben Beale, UMD

We will look at how tomatoes can get infected by the TSWV *(if you already know how this works skip down to the next paragraph)*. Tomato spotted wilt virus (TSWV) is an obligate parasite, i.e., it must have a living host and must be moved from one plant to another by thrips or through cuttings or possibly seed. This disease can affect tomato and other Solanaceae crops as well as lettuce, beans and cucumber. TSWV may occur in the field but tends to affect greenhouse and high tunnel crops more severely. The virus is transmitted most efficiently by Western flower thrips (WFT) (*Frankliniella occidentalis)*, and less so by Onion thrips (*Thrips tabaci*), Tobacco thrips (*Frankliniella fusca*) and several other thrips species. It is not transmitted by Eastern flower thrips (*Frankliniella tritici*). Only immature thrips can acquire the virus, which they can acquire within 15 minutes of feeding, but adults are just about the only stage able to transmit the virus. Adults can transmit the virus for weeks. It may take 2 - 4 weeks from when the adult thrips first feeds on a plant until initial symptoms are observed. Because of this TSWV appears to worsen in plantings over time.

Why are we seeing fruit symptoms but little if any foliar symptoms? The most likely explanation is that TSW viruliferous thrips fed on the flowers or very young fruit. The resistance to the TSWV is expressed (active if you will) in the non-reproductive parts of the plant but not expressed to any extent in the reproductive parts (flowers and fruit) of the plant. Even though the flower and fruit can act as an entry point into the plant the resistant tomato does a good job of limiting the virus into any other areas of the plant. Thus, under low to moderate feeding pressure (1-4 thrips/flower) only the fed upon fruit or possibly a few other fruits on the same cluster become infected. The other possibility is that the TSWV resistance in *Big Beef Plus* is intermediate and under environmental stress it may not be 'complete enough' to protect all of the plant.

Fig. 2 No foliar symptoms of TSWV showing up on tomato foliage. Photo by Ben Beale, UMD

The first question above as to why is the virus showing up at all in a resistant cultivar can be explained by the above paragraph. But there may be another possibility although not in this particular case, that we will have to watch out for in the coming years. And that is resistance- breaking virus variants. The Sw-5b gene (*Sw-5*) is the most

widely used resistance gene for TSWV in tomato. It not only provides resistance to TSWV but also resistance to a several associated viruses including Tomato chlorotic spot virus (TCSV) and Impatiens necrotic spot virus (INSV). The presence of the *Sw-5* gene in tomato plants confers resistance to TSWV by a hypersensitive defense response that causes local lesions on the leaf, preventing the spread of the virus from the infection site through the plant. In 2022, symptoms of TSWV were observed in North Carolina tomato fields on cultivars that had the gene for TSWV resistance (*Sw-5)*. The cultivars from different farms had symptomatic foliage and fruit. Samples were collected from both farms and subjected to sequencing to identify and confirm the presence of resistance-breaking variants, which they did. I mention this because NC is very close by, many growers get their tomato transplants from NC and because the resistance-breaking occurred in the last year or so. These resistance-breaking variants may start to show up in our fields and I am guessing that when they do, we will see 20-40% viral foliar infection and possibly worse in the fruit of resistant plants. For now, we should keep using the resistant cultivars, but watch closely for any breakdown of the resistance.

Resources: 2023. First Report of Resistance-Breaking Variants of Tomato Spotted Wilt Virus (TSWV) Infecting Tomatoes with the Sw-5 Resistance Gene in North Carolina. K. Lahre, R. Shekasteband, I. Meadows, A. E. Whitfield, and D. Rotenberg. Plant Disease vol. 107

Reminder to Start Monitoring Spotted-wing Drosophila

Dr Kelly Hamby has reported that she has been catching Spotted-wing drosophila (SWD) in traps in Central and Western Maryland for a few weeks now, so if you have not yet, it's time to put up SWD traps for monitoring. They prefer fully colored ripe fruit but are capable of infesting fruit that is just starting to turn color.

Check fruit by visual inspection for soft and leaky fruit, or you can monitor it by using salt or sugar water solutions to float eggs and larvae out of fruit. Salt or sugar water solutions can be used to float eggs and larvae out of fruit to monitor fruit infestation. Collect market-ripe fruit if you want to know if your management program is working. If you want to evaluate SWD pressure, collect interior soft and overripe fruit. Lightly crush the fruit in a plastic bag. Add salt (1 cup salt to 1-gallon water) or sugar (1/4 cup granulated white sugar to 4 ¼ cups water) water and let the fruit soak below the surface for 15 – 60 minutes (the longer, the more likely the larvae will leave the fruit). Pour the fruit and water solution through a coarse filter (to remove the fruit) stacked over a reusable basket-style coffee filter. Rinse the soaking bag/container and pour the rinse liquid through the coffee filter, too. The coffee filter will collect the eggs, larvae, and smaller plant parts and fruit flesh if the fruits were crushed a bit too much. Carefully inspect the filter for SWD eggs and larvae with a magnifier (fig 1).

Due to their broad host range and quick reproduction, SWD are difficult to manage. In most cases, especially in preferred hosts such as caneberries

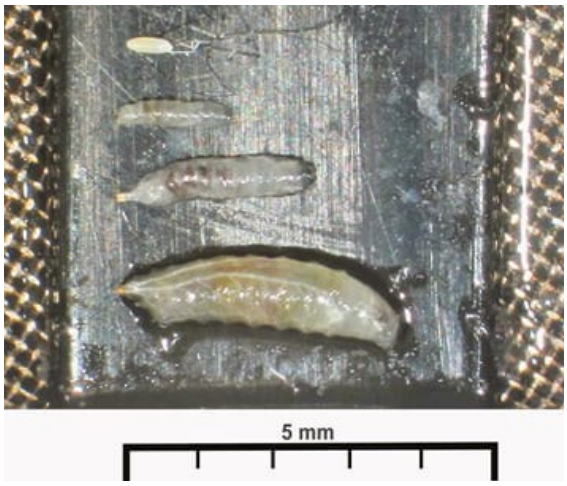

Fig. 1) Spotted-wing drosophila egg (top) and larvae stages. Photo by V. Timmeren.

and later season varieties, a 7-day spray interval is required to maintain near 0 infestation levels, with tighter intervals when rain events occur. Accurate calibration of sprayers, appropriate spray volumes and tractor speeds, and other best practices to ensure good spray coverage are essential.

There are multiple effective insecticide modes of action for SWD, with group 1A carbamates (e.g., Lannate®) and group 1B organophosphates (e.g., diazinon, malathion), group 3A pyrethroids (e.g., Mustang-Maxx®, Danitol®), group 5 spinosyns (e.g., Delegate®, Entrust®), group 28 diamides (e.g., Exirel®, Verdepryn®) and the premix Cormoran® (group 4A neonicotinoid + group 15 benzoylurea) all ranking good to excellent. For organic

production, there are a few OMRI approved materials, with Entrust® being the most effective option. Rotating modes of action (at a minimum, alternate) helps avoid insecticide resistance.

When selecting an insecticide, consider the temperatures at your field during and after the spray application. High summer temperatures positively affect some of the recommended insecticides for SWD management. In contrast, high temperatures adversely affect others, and they rapidly lose effectiveness when temperatures exceed 80 degrees Fahrenheit. The label is the law, make sure the product is registered in your state and crop(s) and follow all restrictions.

SWD prefers to inhabit shady places where humidity is highest. Adjust ground speed, spray volume, and nozzles to ensure the spray reaches through the whole canopy.

Removing and destroying cull fruit and shortening harvest intervals to every 2-days can help reduce on-farm population. For some operations, mesh netting (1.0 x 0.6 mm or smaller) has proven very effective for delaying or reducing SWD. However, sprays may be needed later in the season if populations build under the netting, and supplemental pollination should be considered for some crops. Netting must be installed before SWD are active and cannot have any holes or be left open (e.g., worker or picker entry), so structures with entryways work best. Fruit yields and quality tend to be better when using netting, which also protects from birds and other damage. Cooling fruit (32-36˚F) and holding it cold throughout the supply chain increases shelf life and reduces the likelihood that infestation will result in damaged or unmarketable fruit.

Vegetable & Fruit Scouting Tips

Emily Zobel, AgFS Agent UME

General: As crops move from vegetative to flowering, care should be taken to reduce the negative impact on pollinators and natural enemies. This can be done by choosing a less toxic pesticide or using a foliar spray of neonicotinoid treatment instead of a soil treatment since that leads to less residue in flower nectar and pollen. Check the chemical label for more tips to reduce non-target effects.

Apples: San Jose scale crawlers began emergence a few weeks ago and are active now. If you had high level of feeding damage last year and didn't treat with dormant oil during the winter months now would be the bets time to treat to reduce your population.

Cucurbits:
Conitune to scout for cucumber beetles. They aggregate in fields, so part of your field may have very few beetles, while other locations have plants they defoliated. The threshold for cucumbers, muskmelons, summer squash, and zucchini is 1 beetle for every 2 plants. For butternut, watermelon, and most pumpkins, the threshold is 1 beetle per plant when the plant is small and 2 beetles per plant when the plants are larger.

Squash vine borer will emerge soon, as parts of Maryland reaches 1000-degree days (begin measuring on Jan 1 starting with a 50°F base), which is usually when vines begin producing runners.

With the summer heat coming, it's time to start scouting for spider mites. Mite infestations can be spotty or localized, especially around the borders of vegetable fields. Keeping weeds under control in and around the field now will help to reduce outbreaks later in the summer. Crops should also be checked for mites if carbaryl is used to control cucumber beetles, as it tends to cause aphid and mite flare-ups.
Currently, there is no downy mildew (fig. 1) reported in Maryland or the surrounding states. Downy mildew of cucumber was reported in North Carolina and South Carolina this past week. For updates on where the disease has been reported and on which cucurbits, go to http://cdm.ipmpipe.org/

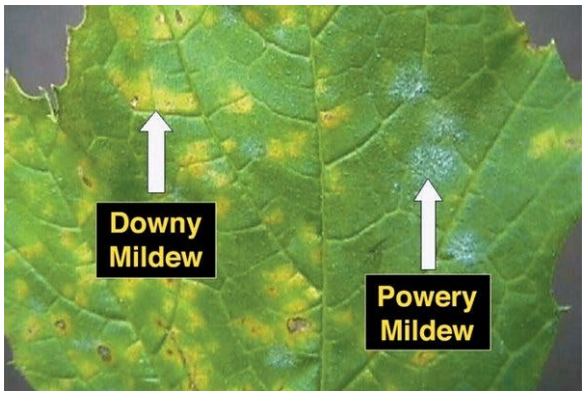

Fig. 1) Comparison of downy mildew and powdery mildew on squash. Photo by David B. Langston, University of Georgia, Bugwood.org.

Cole Crops: Keep scouting for caterpillars and harlequin bugs. During head formation/ curd development in cabbage and broccoli, the thresholds decrease from 30% infested plants to 5%.

Eggplant: Scout for flea beetle and Colorado potato beetle. Suggested thresholds for flea beetles are 2-8 beetles per plant, depending on the size of the plant and growing conditions. The threshold for Colorado potato beetles is based on plant size. When eggplant plants are less than 6" tall, 2 small or 1 large larva per plant. When plants are more than 6" tall, 4 small or 2 large larvae per plant.

The 2024/2025 Mid-Atlantic Commercial Vegetable Production Recommendations can be found at https://go.umd.edu/Vegetable-Production-Recommendations

Potatoes: Continue scouting for the Colorado potato beetle and potato leafhopper. The treatment threshold for Colorado potato beetle on potatoes is 30% defoliation before flowering and 10% defoliation during flowering. The threshold based on insect counts is 25 adults per 50 plants or an average of 4 small larvae or 1.5 large larvae per plant. The thresholds for the leafhopper are 1 adult per sweep or 1 nymph per 10 leaves.

Sweet Corn: Check whorls for caterpillars and flea beetle feeding damage. Inspect 50 to 100 plants in groups of 5 to 20 throughout the field. Treat if 30% of the plants have a caterpillar present at the whole stage and 15% have a caterpillar at tassel emergence. A sprayer configuration with one nozzle directed into the whorl or tassel and a single drop nozzle to the upper parts of the plant gives the best control. Consider using selective products to control caterpillars to help conserve natural enemies and reduce second pest outbreaks.

The Northeast Sustainable Agriculture Research and Education has Released its Call for its Multi-year Grant Programs.

The Research and Education program funds projects that result in gains in farmer knowledge, awareness, skills, and attitudes that are then applied to make measurable on-farm changes leading to greater sustainability. All proposals must include an education program for farmers that seeks to achieve a "performance target" that describes the changes in practices, behaviors or conditions among farmers expected to result from the proposed project. Proposals may be submitted with or without an applied research component supporting the education program.

The Research for Novel Approaches program funds "proof of concept" applied research projects intended to confirm the benefits and/or feasibility of new practices and approaches that have high potential for adoption by farmers in the near future. These practices and approaches may be related to production, marketing, business management, human resource management and other social issues, or other topics related to sustainable agriculture.

Both of these grants are open to anyone who works with farmers, including personnel at nonprofit organizations, colleges and universities, municipalities, tribal governments, state departments of agriculture, for-profit business entities (such as private consultants, farmers, and veterinary practices), etc. Awards typically range from $30,000 to $250,000 for 2-3-year projects. Morre information can be found at https://northeast.sare.org/grants/

SARE Sustainable Agriculture Research and Education

Upcoming UME Events

Additional upcoming events can be found on the UME events website. *This institution is an equal opportunity provider. If you need a reasonable accommodation to participate in any event or activity, please contact your local University of Maryland Extension Office 2 weeks prior to event.*

- **Weed Management Twilight Tour.** June 26, 2024. 4:00 pm – 6:00 pm. A field day for farmers, ag industry professionals, and others interested in seeing the latest results from university weed management trials. These events are free and open to the public.
  More information at http://bit.ly/2024WeedManagementTour

- **Drones In Agriculture -** *This is a one-day seminar with multiple dates and locations*
  Time: 8:30 a.m. - 1:30 p.m. **Cost:** $10.00. More information at http://bit.ly/dronesinag
  - June 25, 2024 | Harford County Ag Center (3525 Conowingo Rd., Street, MD)
  - August 1, 2024 | Wye Research & Education Center (124 Wye Narrows Dr., Queenstown, MD)
  - August 2, 2024 | Upper Marlboro Research & Education Center (2005 Largo Rd., Upper Marlboro, MD)

- **MGGA/UME Summer Winegrape Field Day**, Saturday, June 29, 2024.
  More information to come.

- **Women in Ag Webinars: Setting Up a Farm Chart of Accounts.** July 9, 2024. Virtual at Noon.
  Register at https://go.umd.edu/WomenAgWebinars2024

- **Urban Farm Twilight Tour & Ice Cream Social, July 17, 2024, 5:00 - 7:30 pm** Anne Arundel Extension Office, 97 Dairy Lane, Gambrills, MD.
  More information at https:/go.umd.edu/2024UrbanfarmIcecreamsocial

- ***Save the Date* Maryland State Horticultural Society Summer Tour,** Wednesday, July 10, 2024. More information to come.

- **Lower Shore Vegetable Twilight Tour.** Aug 6, 2024, 5:00-8:30 pm. Lower Eastern Shore Research & Education Center, 27664 Nanticoke Road, Salisbury, MD. Extension Educators and Specialists will showcase their vegetable and berry research plots.
  More information at https://go.umd.edu/2024lesrecVEGtwilight

- **CMREC 2024 Field Crops Research Twilight, Barbecue & Ice Cream Social.** Aug 7, 2024. 4:00 – 9:00 pm. Central Maryland Research & Education Center, (2005 Largo Road, Upper Marlboro, MD). A barbecue dinner will be served at 4:00 pm, followed by homemade ice cream prior to the evening tour. More information at https://go.umd.edu/2024CMRECTwilightsocial

New Online Course for Maryland Cottage Food Producers & On-Farm Home Processors

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If you are starting a value-added food business in Maryland sign up today for the Maryland Food Ventures interactive self-paced online course!

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Dr. Shauna Henley
shenley@umd.edu

For special accommodations, please contact Dr. Shauna Henley before starting the course at shenley@umd.edu or 410-887-8090.

Surveys taken will be used for research purposes (IRB #1917851-3). To participate in the survey you must be at least 18 years of age with a value-added food business located in a private residence (Cottage Food) or on a farm (On-farm Home Processing) in Maryland. Surveys University programs, activities, and facilities are available to all without regard to race, color, sex, gender identity or expression, sexual orientation, marital status, age, national origin, political affiliation, physical or mental disability, religion, protected veteran status, genetic information, personal appearance, or any other legal protected class. The University of Maryland is an Equal Opportunity Employer and Equal Access Program. This course was supported in part by USDA NIFA award number 2018-70027-28588.

Extensión en Español Check out Extensión en Español, a Spanish language blog by two UMD professors, Anahí Espíndola (Entomology) and Macarena Farcuh (Plant Sciences & Landscape Architecture). They cover a range of topics, including fruit, pollinators, pests, soils, and pesticides.

https://extensionesp.umd.edu/

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Header photo By E. Remberg

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