

PENNSYLVANIA
VEGETABLE GROWERS

NEWS

for the commercial vegetable, potato and berry grower

June 2020 / Volume 43 Number 6

2020 Summer Educational Opportunities

The usual focus of our special June newsletter is to publicize the summer educational events conducted by Penn State Extension and other groups across the state. As you may have guessed, this year due to the coronavirus, there will be very few events planned. This spring, Penn State Extension offered many webinars and online courses for free during the pandemic stay-at-home period that attracted thousands of viewers from across the country setting new records for Extension's online outreach programs. Extension will not be planning any in-person events until this fall and even Ag Progress Days has been cancelled for 2020. However, growers can still keep informed despite the lack of in-person meetings through the following resources.

PVGA Weekly Update

Members of the Pennsylvania Vegetable Growers Association (PVGA) who have email receive the PVGA Weekly Update – a compilation of articles and other information available on the

internet of interest to growers. While the Update is normally sent out each Saturday evening, during the coronavirus crisis Special Updates were sent out during the week to try to keep growers informed about current developments and resources available. If you are not a PVGA member (that is you do not receive this newsletter every month) you can join the Association for the rest of 2020 for only \$27.50 – half the regular dues rate of \$55. Simply send a check with your name, mailing address and email address to PVGA at 815 Middle Rd., Richfield, PA 17086, or you can join online at www.pvga.org/registration.

Pennsylvania Vegetable Growers News

PVGA also publishes its own monthly newsletter – this is complimentary sample copy if you are not a member (again, members receive this newsletter every month). Besides current news that pertains to vegetable, potato and berry growers that may not be readily available elsewhere, the newsletter also contains timely articles on vegetable, potato and berry production from Penn State Extension and other sources as well. Again, if you are not a PVGA member you can join the Association for the rest of 2020 for only \$27.50 – half the regular dues rate of \$55. Simply send a check with your name, mailing address and email address to PVGA at 815 Middle Rd., Richfield, PA 17086, or you can join online at www.pvga.org/registration.

Pennsylvania Vegetable IPM Weekly Update

The PA Vegetable Marketing and Research Program offers growers the PA Vegetable IPM Weekly Update available by email, fax or regular mail. These Updates contain current sweet corn, tomato, curcubit, berry and general integrated pest management (IPM) information from Penn State Extension specialists throughout the season until early September. To request these Updates, email the Program at pvmrp@embarqmail.com or call 717-694-3596 as soon as possible to get on the list for the weekly mailings, faxes or emails. Please note that faxes will normally be sent during the nighttime hours. These Updates are also posted on the PAVeggies.org website at <https://www.paveggies.org/farmers/ipm-weekly-updates/>.

1-800-PENN-IPM Hotline

Penn State Extension is pleased to announce a major revision to its 1-800 PENN IPM hotline to better serve the horticultural and agricultural community.

Callers may now select from a greater number of integrated pest management and cultural practices topics. This is a toll-free service offered by Penn State specialists and educators with messages updated on a regular if seasonal basis. See complete article on page 20.

Continued on next page



The Pennsylvania Vegetable Marketing and Research Program – PAVeggies – will again be celebrating August as PA Produce Month. To see how you can take advantage of this promotion for your market, see page 17 and www.PAVeggies.org. You can also follow #PAVeggies on Facebook and Instagram.

NEWS



*Pennsylvania
Vegetable Growers
Association*

*An association of
commercial vegetable,
potato and berry growers.*

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What's Happening on the Farm

Brian Campbell

Are We Doing Enough?

We received an inquiry regarding what PVGA is doing concerning the social unrest going on around the country. I like to think of fellow farmers I know as “leaders by example”. We may not be out in front during protests, but we are actively making a difference in the lives of others – others being all people.

I would like to share a personal situation that happened. An “undocumented worker” left work late one evening after receiving his payroll monies. He lived about 10 miles away and when he arrived in his town, a police officer pulled him over. There was no legitimate reason to pull him over. He was pulled over because the police officer wanted to steal \$700 from him. I learned the next day what happened. I stepped up to the plate and worked with the state police. A year later the police officer involved was convicted of numerous charges, paid back the monies, did jail time and lost his job.

I have also heard several stories of fellow farmers helping others. A family farm helped several families who worked on the farm obtain better lives – better lives in the way of supporting their families getting higher education.

We need to be leaders by example by stepping up to the plate when we see other people being wronged or hurt, regardless of whether they are people of color or of different ethnic or religious backgrounds – helping others when the opportunity arises.

Mr. Campbell is the current President of the Association.

He grows fresh market vegetables for both the retail and wholesale markets on his farms near Berwick.

2020 Summer Educational Opportunities *continued from page 1*

Marrone Bio Weekly Teleconferences

Every Wednesday, at 12:30 pm EST, Steve Bogash of Marrone Bio Innovations hosts a weekly pest management education teleconference. These calls are for growers, retailers and crop consultants. The calls last 30 minutes and begin at 12:30 PM EST. The first 15 minutes is devoted to reports on seasonal and active pest management challenges in vegetables and small fruit with a guest expert. Then, the call is opened to discussion and Q & A. The calls are recorded and accessible thru the playback number below.

Call-In Number for the live Wednesday teleconference: 515-604-9914, Access Code: 832191.

To hear recordings of the previous teleconferences, call the Playback Number: 515-604-9875. You will automatically be dropped into the most recent session, but can access past recordings by applying the correct reference number when prompted.

#1 – Managing Seedcorn, Cabbage and Onion Maggots – Ben Werling, MSU

#2 – Managing Botrytis Indoors – Tom Ford, PSU

#3 – Strawberry Pest Management – Kathy Demchak, PSU

#4 – High Tunnel and GH Insect and Mite Management – Tim Elkner, PSU

#5 – Managing Root and Crown Rots With Living Bios / Root Shield – Mike Brownbridge, BioWorks

#6 – Managing Cucumber and Potato Beetles – Tom Kuhar, VA Tech

#7 – Seasonal Pest Roundup; Current Scouting Report – Steve Bogash, Marrone Bio

#8 – Finishing Blueberries and Blueberry Pest Management – Dean Polk, Rutgers Coop Ext.

#9 – Vinecrop DM Management – Meg McGrath, Cornell

#10 – Managing Vinecrop DM – Meg McGrath, Cornell

#11 – Summer Vegetable Insect Management – Brian Nault, Cornell

#12 – Current Pest Challenges and Solutions – Tom Ford, PSU Coop Ext.

Continued on page 4

The **Pennsylvania Vegetable Growers News** is the official monthly publication of the Pennsylvania Vegetable Growers Association, Inc., 815 Middle Road, Richfield, PA 17086-9205
Phone and fax: 717-694-3596 • Email: pvga@pvga.org • Website: www.pvga.org

Our Mission: The Pennsylvania Vegetable Growers Association serves Pennsylvania's commercial vegetable, potato and berry growers through education, research, advocacy and promotion.

Our Vision: The Pennsylvania Vegetable Growers Association will be the driving force in ensuring the future viability of the commercial vegetable, potato and berry industries in Pennsylvania.

Inquiries about membership, this publication or advertising rates should be directed to William Troxell, Executive Director, at the above address.

NEWS

Important Updates on COVID-19

Throughout May, the COVID-19 pandemic continued to have far-reaching implications for many aspects of agriculture and daily life in Pennsylvania. However, parts of Pennsylvania have started to reopen.

The following updates reflect new information and advocacy efforts during the month of May. Please note, this information is accurate as of the end of May. Be sure to visit pfb.com/coronavirus for the most up-to-date information.

Farm employees

- The Occupational Safety and Health Administration (OSHA) began enforcing new rules on employer COVID-19 reporting May 26. Employers are responsible for recording cases of COVID-19. Employers with fewer than 10 employees are exempt from this requirement except in cases where work-related cases of COVID-19 result in a fatality or an employee's in-patient hospitalization, amputation, or loss of an eye. In determining whether a case of COVID-19 is work-related, employers are not expected to conduct a full medical investigation but may ask the employee how he or she believes that he or she contracted COVID-19 and consider evidence that suggests the case is likely work-related, such as whether there are cases among other employees, whether the employee became sick soon after close exposure to a customer or coworker who was sick and whether the employee's job requires him or her to be in close contact with the public in an area where there is community spread. The case is likely not work-related if the employee is the only worker to contract COVID-19 and does not come in contact with the public at work; and/or if the employee has had close contact outside of work with someone who has COVID-19. Visit <https://bit.ly/36D0pk0> to see OSHA's complete guidance.
- U.S. Citizenship and Immigration Services has announced temporary flexibility for verifying employment eligibility using form I-9 if the prospective employee is not able to renew a List B document. When the employee provides an acceptable, expired List B document that has not been extended, the employer should record the document information in Section 2 under List B; enter "COVID-19" in the additional information field; and, within 90 days after DHS's termination of the temporary policy, require the employee to present a valid unexpired document

to replace the expired document presented when they were initially hired.

- COVID-19 resources related to farm worker housing can be found in the Pennsylvania Department of Agriculture website at <https://www.agriculture.pa.gov/Documents/Seasonal%20Farm%20Labor%20Camp%20Guidance.pdf>

Transportation

- Some PennDOT service centers have started reopening on a limited basis in yellow phase counties. Visit www.penndot.gov/pages/coronavirus.aspx for more information on which centers are open.
- Pennsylvania driver licenses, photo ID cards, learner's permits, vehicle registrations of all classes (including apportioned vehicle registrations and biennial farm exemption certificates), safety and emissions inspection stickers and disability parking placards that have an expiration date between March 16 and May 31, will be valid until June 30. Visit <https://bit.ly/2zvhwlh> to learn more.

Penn State Extension

Penn State Extension has added to its offering of COVID-19 resources for agriculture. Recent additions include:

- The Farm Market Finder App to help connect consumers with farmers offering direct sales. Learn more at extension.psu.edu/farm-market-finder-app.
- An interactive map of broadband availability in Pennsylvania to help inform efforts to expand access to high-speed internet. Learn more at extension.psu.edu/pennsylvania-broadband-map-app.
- Webinar series that aim to help H-2A employers navigate unique concerns related to COVID-19 and for dairy producers to make long-term decisions and plans. Learn more at extension.psu.edu/ag-workers-visa-covid-19.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

USDA Offers New COVID-19 Aid Program for Farmers

Farmers can now apply for the U.S. Department of Agriculture's Coronavirus Food Assistance Program, which aims to help agricultural producers weather the price and market challenges they've faced amid the global COVID-19 pandemic.

The pandemic has sent agricultural commodity prices into a tailspin and caused disruptions throughout the food supply chain. The crisis unfolded just as the agriculture economy was showing signs of improvement after years of price and market volatility.

The CFAP program calls for \$16 billion in direct payments to producers based on actual losses. Farmers will receive 80 percent of the payment upfront and then the remaining 20 percent if funding remains at the end of the application period.

To be eligible, farmers must:

- Have produced a commodity that suffered at least a five percent price drop or had losses due to market supply chain disruptions due to COVID-19 and face additional significant market costs;
- Have an average adjusted gross income of less than \$900,000 for tax years 2016, 2017, and 2018 unless 75 percent of their

adjusted gross income comes from farming, ranching, or forestry;

- Meet conservation compliance provisions (the "Highly Erodible Land and Wetland Conservation" regulations);
- Not have a controlled substance violation.

CFAP payments are limited to \$250,000 per person; however, special payment limitation rules will apply to corporate entities which may receive up to \$750,000 based upon the number of shareholders (up to three) who contribute at least 400 hours of active person management or personal active labor.

Certain commodities were not included in the program because they did not suffer a five percent or greater price decline from mid-January to mid-April 2020, including sheep more than two years old, eggs/layers, soft and hard red winter wheat, white wheat, flax, rye, feed barley, alfalfa, forage crops, hemp, tobacco and others. However, USDA will consider including those commodities if farmers can demonstrate they meet the criteria. Farm

Continued on page 4

NEWS

2020 Summer Educational Opportunities *continued from page 2*

This program is organized by Marrone Bio Innovations (MBI), a global supplier of bio-based plant health and pest management solutions. While MBI products may be mentioned, the teleconferences will be focused on pest management education and solutions.

PASA Workshops and Webinars

On August 5 Pasa Sustainable Agriculture will be hosting an **Equipment Demo and Farm Incubator Tour** at two locations. Equipment, land, and infrastructure are some of a beginning farmer's biggest expenses when starting their own farm business. Effectively planning for the type of tools and equipment you'll need for your unique operation will reduce soil and weed management challenges, while participating in a farm incubator program can significantly reduce the cost of land and infrastructure during your start-up years.

During the equipment demo and farm incubator tour at Hilltop Urban Farm in Pittsburgh from 5:30 to 7:30 p.m., they will review a variety of soil and weed management tools and equipment for small vegetable farmers and discuss Hilltop's incubator program for start-up farms.

At the event at the Seed Farm in Emmaus from 3:00 to 5:30 p.m. manager Brad Pollock will discuss what equipment works best for his small vegetable farm in Lehigh County, Pennsylvania and will review a variety of soil and weed management equipment used at the Seed Farm, including:

- Hand tools (wheel hoe, hand stirrup hoe, cobra head hoe, broadfork)
- Walk-behind tractor with implements (BCS)
- Tractor mounted cultivators (I&J cultivator, Williams tool system)

- Flame weeder
- Primary and secondary tillage implements (Celli spader, chisel plow, moldboard plow, disc)

See <https://pasafarming.org/events/category/pasa-event/> for registration information or call 814-349-9856 x710.

On August 18, Pasa will present a webinar entitled **Fundamentals of IPM: In the Field** from 7:00 to 8:30 p.m. The speaker will be Abby Seaman, Senior Extension Associate at Cornell University: Abby promotes and supports the adoption and use of IPM practices among conventional and organic vegetable farmers through a combination of applied research, demonstration projects, educational programs, and networking in collaboration with colleagues at Cornell throughout the Northeast and beyond. This webinar is free - register at <https://pasafarming.org/event/fundamentals-of-ipm-in-the-field/>.

On September 9, Pasa will be hosting a **Cover Crops Strategies for Vegetable Farms** workshop at the Pennypack Farm in Horsham from 3:00 to 5:30 p.m. Join the farmers at Pennypack Farm & Education Center for a discussion of the cover crop strategies they use to protect and enrich the soil, and increase the yields, on the nonprofit's 13-acre diversified vegetable CSA in Horsham, Pennsylvania. Topics covered will include species selection for specific uses, timing plantings, cultivation, and termination.

Attendees will be invited to ask questions relevant to their own operations as well, including options for cover crop planting that could still be viable before the end of the 2020 growing season. Register at <https://pasafarming.org/event/cover-crop-strategies-for-vegetable-farms/> or call 814-349-9856 x709.

USDA Offers New COVID-19 Aid Program for Farmers *continued from page 3*

Bureau is advocating for a broader array of commodities to be included in the program and encourages members to also contact USDA if they believe a commodity should be included.

Farmers can apply by contacting their Farm Service Agency county office. FSA offices are open by phone appointment only so be sure to call ahead. Find your county service center at **offices.usda.gov** or call **202.720.2791**.

Learn more about the program at **farmers.gov/cfap**.

The following is an overview of how payments will be calculated for specific commodities.

Non-specialty crops

Eligible non-specialty crops include malting barley, canola, corn, millet, oats, soybeans, sorghum, sunflowers, durum wheat, and hard red spring wheat.

Producers will be paid based on inventory subject to price risk held as of Jan. 15, 2020. Payment will be made based on 50 percent of a producer's 2019 total production or the 2019 inventory as of Jan. 15, 2020, whichever is smaller. That amount will be multiplied by 50 percent and then by the commodity's payment rate.

Visit **farmers.gov/cfap/non-specialty** for payment rates for each commodity and additional information.

Specialty Crops

Specialty crops producers are eligible for payments if they fall into at least one of three categories:

- Had crops that suffered a five percent-or-greater price decline between mid-January and mid-April as a result of the COVID-19 pandemic.
- Had produce shipped but subsequently spoiled due to loss of marketing channel.
- Had shipments that did not leave the farm or mature crops that remained unharvested.

The following commodities are eligible in at least one of those categories: almonds, apples, artichokes, asparagus, avocados, beans, blueberries, broccoli, cabbage, cantaloupe, carrots, cauliflower, celery, sweet corn, cucumbers, eggplant, garlic, grapefruit, kiwifruit, lemons, lettuce (iceberg and romaine), mushrooms, onions (dry and green), oranges, papaya, peaches, pears, pecans, peppers, potatoes, raspberries, rhubarb, spinach, squash, strawberries, sweet potatoes, tangerines, taro, tomatoes, walnuts and watermelons.

Payment details and additional information are available at **farmers.gov/cfap/specialty**.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Are your labels compliant with the Food Safety Modernization Act?

Now it is possible to create and print your own FSMA compliant labels even if you don't own a computer

In 2017, the government is requiring all fruit and vegetable companies to label their products, including information like when the product was packed, the grower number, field location, and other information.



The Texpak FSMA labeling system consists of a small printer that can either be operated with a computer or can be used as a stand-alone system with an optional keyboard.

Texpak can help create and design up to four label formats for you at no charge to fit your specific needs. Below are samples of some of the labels we have created for fruit and vegetable growers. In addition, Texpak can provide full pre-printed labels should you be looking for product branding purposes.

Freon Fruit Farm Inc
231 Powdermill Hollow Rd.
Boyerstown Pa 17012

Variety: _____
Block: _____
Date: _____
Picker(s): _____
Amount: _____

LARGE # 2 TOMATO
JOE MARTIN #1277
PACKED: 06/06/16

Growers #1400 Field # 2

Size: **Large Tomatoes**

Steven Martin Packed Date
Shippensburg PA 8/11/16

Apple Cider
Keep Refrigerated

No Preservatives

FAIRMOUNT ORCHARD
558 GOODS ROAD
EPHRATA PA 17522

WARNING: This product has not been pasteurized and therefore may contain harmful bacteria that can cause serious illness in children, the elderly, and persons with weakened immune systems.

1 GALLON

If you have any questions about our system or would like help with your labeling needs, please contact us by email or phone, as indicated below.

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Resources Available for Farms, Businesses

Assistance and resources are available for farms and businesses that have been financially affected by steps to control the spread of COVID-19.

- Visit www.pfb.com/coronavirus and select Help/Resources for the latest information on federal loan programs available.
- Penn State University has created a new online network to connect producers, suppliers, processors and workers throughout the food supply chain to minimize bottlenecks. The Pennsylvania Agriculture Resilience Network allows users to post offers to help, make connections throughout the supply chain to help farmers find a market for their products and match farmers with agricultural workers. Visit parn.psu.edu to learn more.
- Food processors and retailers can obtain free personal protective equipment for employees through the Pennsylvania Emergency Management Agency. Equipment comes in boxes of 500. Request protective equipment at https://forms.office.com/Pages/ResponsePage.aspx?id=QSiOQsgB1U2bbE-f8Wpob3ped6g6V4uxBkHM0bKx_a79UODizWUFCMVf-NUIY3T1QxSDZIQtg2SjBBW4u.
- USDA is in the process of launching a program that will offer loan guarantees to rural businesses and agricultural producers that are not eligible for USDA Farm Service Agency loans. Learn more at <https://bit.ly/2WSX0dv>.
- Learn more about state financial resources for affected businesses at dced.pa.gov/funding-programs.

- USDA Rural Development has created a resources page for customers affected by COVID-19. Learn more at rd.usda.gov/coronavirus.
- The state Office of Unemployment Compensation has important resources available for affected employers. Learn more at <https://bit.ly/2UMmg2O>.
- DCED has created a directory for businesses and organizations in need to personal protective equipment to connect with manufacturers and suppliers. Learn more at <https://bit.ly/2x4mF8W>.
- American Farm Bureau's farm stress training program is now available to all Farm Bureau members for free. The Rural Resilience training provides value to anyone who is under stress and is designed for individuals who interact with farmers and ranchers to understand the sources of stress, identify effective communication strategies, reduce stigma related to mental health, and learn the warning signs of stress and suicide. Visit <https://bit.ly/3bD6uP8> to learn more.
- Penn State Extension has created a one-stop shop for COVID-19 resources on its website extension.psu.edu/coronavirus.

NOTE: This information is accurate as of the end of May. As the situation has been changing rapidly, we encourage you to visit www.pfb.com/coronavirus for the most up-to-date information.

From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, June 2020.

SBA Continues to Accept New EIDL Applications

In continued response to the Coronavirus (COVID-19) pandemic, small business owners – including agricultural businesses, in all U.S. states, Washington D.C., and territories are able to apply for an Economic Injury Disaster Loan advance of up to \$10,000. This advance is designed to provide economic relief to businesses that are currently experiencing a temporary loss of revenue. **This loan advance will not have to be repaid.** Recipients do not have to be approved for a loan in order to receive the advance, but the amount of the loan advance will be deducted from total loan eligibility. SBA will begin accepting new Economic Injury Disaster Loan (EIDL) and EIDL Advance applications starting on **June 15** to qualified small businesses and U.S. agricultural businesses.

Applicants who have already submitted their applications will continue to be processed on a first-come, first-served basis. For agricultural businesses that submitted an EIDL application through the streamlined application portal prior to the legislative change, SBA will process these applications without the need for re-applying.

Eligible small businesses and agricultural businesses may apply for the Loan Advance at <https://covid19relief.sba.gov/#/>.

For more information see <https://www.sba.gov/funding-programs/loans/coronavirus-relief-options/economic-injury-disaster-loan-emergency-advance>.

From the **Plant and Pest Advisory**, Rutgers Cooperative Extension, June 17, 2020.

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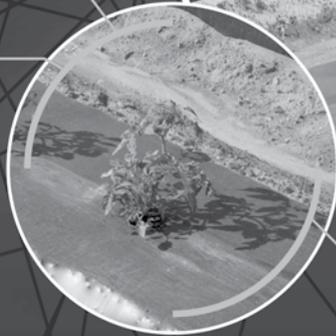
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NEWS

State News Briefs

State Adopts Short-Term Budget

Pennsylvania lawmakers passed a stop-gap state budget that continues current funding levels through November while they determine how to address budgetary challenges brought on by the COVID-19 pandemic.

The General Assembly approved and Gov. Tom Wolf signed a short-term funding plan in May, which continues level funding for state programs as well as state-related universities, including Penn State and its extension programs. In addition, the General Assembly appropriated federal COVID-19 relief dollars to state programs, including \$20 million to help the state's dairy industry.

Lawmakers will be facing tough decisions when they return for a "lame-duck" session following the November general election. The pandemic hit just about every state revenue source—including income and sales taxes—resulting in what's currently estimated to be a nearly \$5 billion shortfall.

In May, Pennsylvania Farm Bureau sent legislators suggestions on what to prioritize for agriculture, including:

Maintaining at least level funding for Penn State Extension.

Keeping adequate funding for the core services of the Pennsylvania Department of Agriculture, including food safety, animal health and market development.

Supporting the Pennsylvania Agriculture Surplus System, which helps connect the charitable food system with excess farm products that would otherwise go to waste, at \$5 million.

Continuing support for programs that help farmers diversify and engage in direct-to-consumer sales, such as the Very Small Meat Processing Grants and Dairy Development Grants.

"Pennsylvania Farm Bureau recognizes the General Assembly is facing difficult budget decisions ahead and that some agriculture programs may face reductions or elimination," PFB President Rick Ebert said in a letter to lawmakers. "Our encouragement is to focus on the core needs of the agriculture community such as market development, plant and animal health and research and education. These are the programs that protect the health of the agriculture industry and guide farmers in making business decisions."

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Coalition Calls for Broadband Expansion

A coalition of statewide agriculture, business and local government organizations recently called on the General Assembly to move quickly on legislation to improve broadband access in rural communities.

"No one single piece of legislation will close the digital divide," the coalition wrote. "Instead, there is a need for multiple legislative initiatives, including using both public and private investment, and a regulatory framework that streamlines buildout so that all Pennsylvanians can have access to broadband."

Inadequate broadband access, particularly in rural communities, has long been a concern in the Keystone State. But the major shifts in daily life brought on by the COVID-19 pandemic have underscored the challenges that result from disparities in broadband accessibility.

"Many businesses went to telecommuting, a greater number of consumers began ordering necessities online and students went from in-classroom instruction to learning virtually through web-based platforms," the coalition wrote. "The disruption of everyday life as a result of COVID-19 is tolerable and manageable with robust, strong, internet connectivity, but it is difficult—and in some cases impossible—in some regions of Pennsylvania."

Members of the coalition include Pennsylvania Farm Bureau, National Federation of Independent Business, Pennsylvania School Boards Association, County Commissioners Association of Pennsylvania, Pennsylvania State Grange, and the Pennsylvania Chamber of Commerce and Industry.

The state House Consumer Affairs Committee voted in late May to advance two broadband-related bills. The measures now head to the full chamber for consideration.

House Bill 2348, introduced by Reps. Martin Causer and George Dunbar, would create a Universal High-Speed Broadband Funding Program, with funding being repurposed from an existing tax credit. This funding, coupled with other potential revenue sources, such as federal dollars, would be used to encourage the deployment of broadband service in underserved communities.

House Bill 2438, introduced by Rep. Clint Owlett, would make it easier for rural electrical cooperatives to run fiber optic lines and other broadband communications infrastructure across existing rights-of-way. There are provisions in the bill that would require the cooperative to seek new agreements if the installation of broadband service would require new poles or other in-the-ground infrastructure.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Continued on page 10

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Agriculture Services

NEWS

State News Briefs *continued from page 8***Governor Vetoes Bill Including Garden Centers Measure**

Gov. Tom Wolf has vetoed a bill that included a measure to reopen independent garden centers, as well as some other types of businesses, statewide. For garden centers, the issue is largely moot now that all Pennsylvania counties have been scheduled to shift into the less-restrictive “yellow phase” of the governor’s reopening plan, which allows garden centers to open with certain restrictions, by June 5. But for garden centers that had to remain closed until early June due to the state’s response to the COVID-19 pandemic, the damage was already done as they had missed out on the busiest part of their season.

The measure to reopen garden centers with certain safety precautions in place won bipartisan support in the state House. In the Senate, the measure was amended into a broader bill addressing business reopenings. That legislation, House Bill 2388, cleared the Senate with a 31–17 vote and the House with a 123–79 vote but was ultimately vetoed by the governor.

Pennsylvania Farm Bureau and PVGA had urged Wolf to allow independent garden centers to open statewide using the curbside or parking lot pick-up model employed by restaurants for take-out.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Bill Clarifying Sales Tax Exemption for Multipurpose Agricultural Vehicles Advances

A bill that would clarify when off-road vehicles used in farming are exempt from sales tax has cleared its first hurdle in the General Assembly.

The Senate Finance Committee voted in May to advance Senate Bill 1041, sending it to the full chamber for consideration. Pennsylvania Farm Bureau worked with Sen. Kim Ward of Westmoreland County to introduce the measure.

Pennsylvania law exempts farmers from paying sales tax on ATVs or other multipurpose agriculture vehicles, provided that they are being used primarily for farming purposes. However, the state Department of Revenue has a narrow definition of what constitutes a farming activity. For example, repair of fencing is not considered a farming activity, because it is not directly part of the

raising of crops or animals; however, as any farmer knows, care of fences is critical for managing animals.

The bill would broaden the definition of a farming activity to include common farm-related tasks. The aim is to ensure that farmers are able to claim the sales tax exemption for off-road vehicles they use as part of their farming operations.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Pennsylvania To Receive Federal Funding for Conservation Measures

Pennsylvania will receive funding from the EPA as part of the “Most Effective Basin Funding Initiative,” an increase in available funding for the Chesapeake Bay Program.

Out of the \$6 million in total allocated to states within the Chesapeake Bay watershed, Pennsylvania will receive \$3.6 million to go towards implementation of on-farm conservation practices and best-management practices that will reduce nitrogen loads from farms to meet the goals of the state’s Phase 3 Water Implementation Plan (WIP3). The funds are intended to go towards “shovel-ready” projects that include cover crops, tillage management, horse pasture management, livestock exclusion measures like stream fencing and stream crossings, streamside and riparian forest and grass buffers, and implementation of nutrient management practices and soil and water conservation plans.

The funding is intended for the state and local entities, including counties, municipalities, townships and conservation districts to help farmers within the watershed implement management practices that will help reach the goals set forth in the WIP3, a road map of sorts for how the state will meet federally mandated goals to reduce nitrogen, phosphorus and sediment pollution in the bay by 2025.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Game Commission Considers CWD Response Plan

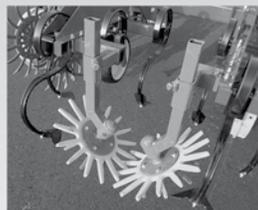
The Pennsylvania Game Commission is considering a revised plan to control the spread of Chronic Wasting Disease in Pennsylvania.

The proposal calls for expanded testing and surveillance, increased hunter opportunities in CWD-infected areas, targeted

Continued on page 12



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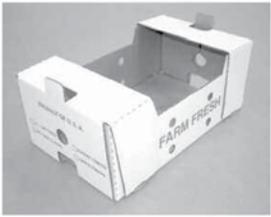
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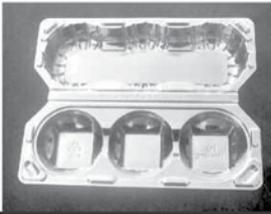
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NEWS

State News Briefs *continued from page 8*

removals (sharpshooters), a state-wide ban on all deer attractants and a state-wide feeding ban of wild deer. The plan also calls for the PGC to collaborate with the PDA to strengthen their oversight of deer farms. Pennsylvania Farm Bureau supports most of what is outlined in the plan, but has submitted comments to the PGC in opposition to the proposed feeding ban. Currently, a feeding ban is in place within the designated Disease Management Areas where CWD is prevalent. The new proposal, if adopted, would expand that ban to the entire state. The plan is lacking in detail as to the specific measures a statewide feeding ban would include.

An official date for when the plan is presented to the Board of Commissioners for final approval has not yet been set. Details of the proposed plan are available at www.pgc.gov.

In 2019, 204 wild deer in Pennsylvania tested positive for CWD from 15,688 tested samples, an increase from 123 confirmed cases in 2018. So far in 2020, seven deer have tested positive from 1,440 samples. CWD affects cervids and is always fatal.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Election of PSU Agriculture Trustees Postponed

The election of delegates from agricultural societies to the Penn State Board of Trustees has been postponed due to prohibitions on large gatherings amid the COVID-19 pandemic.

Voting for agricultural trustees involves in-person caucusing and voting by members of certified agricultural organizations, including Farm Bureau, in each county.

Under the board's bylaws, the current agricultural interest trustees will continue to serve until their successors are appointed or elected, with the exception of Keith Masser, who will have served the maximum permitted 12 years as of the end of June. After June 30, Masser's seat will remain vacant until a successor is elected.

Six delegates from agricultural societies serve on the Board of Trustees and two are elected each year.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.

Reminder: Leopold Award Nominations Open

Pennsylvania farmers who have gone above and beyond in caring for natural resources are encouraged to apply for the prestigious Leopold Conservation Award. The nomination period for the 2020 award is open now through Aug. 1.

Given in honor of renowned conservationist Aldo Leopold, the \$10,000 award recognizes landowners who inspire others with their dedication to land, water and wildlife habitat management on private, working land.

Sand County Foundation, the nation's leading voice for conservation of private land, presents the award to private landowners in 20 states for extraordinary achievement in voluntary conservation. This is the third year the award has been offered in Pennsylvania, where it is presented in partnership with Pennsylvania Farm Bureau and Heinz Endowments.

Nominations for the 2020 award—which will be presented at the 2021 Pennsylvania Farm Show in January—may be submitted on behalf of a landowner, or landowners may nominate themselves. The application can be found at: sandcountyfoundation.org/uploads/PA-2020-CFN-1.24.2020.pdf.

Applications may also be mailed to: Pennsylvania Farm Bureau; c/o Joel Rotz; PO Box 8736; Camp Hill, PA 17001-8736.

From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2020.



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NEWS

PA Agriculture Resilience Network Online to Locate or Offer Assistance

Heather Karsten

To help the agriculture community respond rapidly to COVID-19 and other future disruptions in the food supply chain, the PA Agriculture Resilience Network was created.

A Penn State team has launched the PA Agriculture Resilience Network platform online to help the agriculture community respond rapidly to COVID-19 and other future disruptions of the food supply chain. COVID-19 disruptions vary widely — from the reduced dairy market and processing capacity, to travel restrictions for seasonal workers, and employees who have been infected. When interruptions such as these and others arise, anyone in Pennsylvania can use a smartphone, tablet, or computer to access the PA Agricultural Resilience Network website to seek assistance or offer help within minutes. Users can also identify the location of agricultural supplies in the region or find online agricultural resources and organizations.

Funded by the Institute for Sustainable Agricultural, Food, and Environmental Science in the College of Agricultural Sciences, and led by Patrick Drohan, associate professor of soil science, a team from Penn State and other agricultural organizations created the “Pennsylvania Agriculture Resilience Network.” The website features four user-friendly tools:

- **Assist** where users can request help or post a need
- **Offer help** where users can offer assistance such as labor, equipment, supplies, services, and post a resume
- **Supply** is a Google map populated with many types of agricultural entities that can supply agricultural farm products, seed, fertilizers, feed mills, equipment, parts, etc.
- **Resources** include multiple online technical information sources and are still under development. Examples include academic sources, agricultural organizations, government resources, and supply search tools.

Drohan explains “I live in farm country, and I see the farmers around me sometimes struggling with the basic logistics of how to get materials and supplies as different sources have gone out of business.” As COVID-19 disruptions further complicate these local challenges, the PARN website is designed to help.

Dr. Karsten is with the Department of Plant Science at Penn State Univ. From Penn State Extension, <https://extension.psu.edu/pa-agricultural-resilience-network-online-to-locate-or-offer-assistance>, May 20, 2020.



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PAVEGGIES OFFERS NEW POINT-OF-PURCHASE MATERIALS

The Pennsylvania Vegetable Marketing and Research Program is again offering a variety of point-of-purchase materials to growers who retail their produce. But some new items have been added since the Program sent its initial mailing to growers in early June.

The big news is that **PRICE PADDLES ARE BACK!** PAVeggies is excited to be able to offer small and large price paddles with the PA Produce logo on them. We have also added several new "How to Use" cards for consumers.

Use the form below or you can write the new items onto the form you received from the Program.

Growers who pay their assessments to the Program are eligible for a credit of half of their assessment payment up to a maximum of \$25.

To take advantage of this credit please call the Program at 717-694-3596.



Item (see numbers in picture)	#	Cost	Total
1. "PA Preferred" "Fresh Local Vegetables" Banner*		\$14.00	
<i>*Growers must be licensed members of the PA Preferred Program to order the "Fresh Local Vegetables" Banner.</i>			
2. "PA Produce Month" Promotion Kit (2 lg. posters, 20 price cards)		\$2.00	
3. "PA Produce Month" Small Posters (pack of 6)		\$0.50	
4. Roadside Sign (1) \$10.00		\$10.00	
5. Crop Stickers for Signs (indicate the number of each)		\$0.50	
<input type="checkbox"/> Asparagus <input type="checkbox"/> Sweet Corn <input type="checkbox"/> Tomatoes <input type="checkbox"/> Peppers <input type="checkbox"/> Pumpkins <input type="checkbox"/> Cantaloupes <input type="checkbox"/> Watermelons <input type="checkbox"/> Green Beans <input type="checkbox"/> Strawberries <input type="checkbox"/> Fall Crops <input type="checkbox"/> Organic <input type="checkbox"/> Just Ahead <input type="checkbox"/> Farm Fresh <input type="checkbox"/> arrow <input type="checkbox"/> blank			
6. Price Cards – 5" x 7.5" (pack of 10)		\$4.00	

Item (see numbers in picture)	#	Cost	Total
7. Clip-On Price Cards – 3" x 4" (pack of 10 with extra inserts)		\$7.00	
8. Price Paddles - Small, 9" tall (pk 10)		\$4.00	
9. Price Paddles – Large, 12" tall (pk 10)		\$9.00	
10. Price Stickers (roll of 500)		\$6.50	
11. Activity Cards (pack of 50)		\$4.00	
12. Brochures (pack of 50)		\$3.00	
13. How To Use Cards (tablets of 50)		\$1.50	
(indicate number of tablets of each crop)			
<input type="checkbox"/> Cauliflower <input type="checkbox"/> Brussels Sprouts <input type="checkbox"/> Sweet Potatoes <input type="checkbox"/> Broccoli <input type="checkbox"/> Cabbage <input type="checkbox"/> Kohlrabi <input type="checkbox"/> Summer Squash <input type="checkbox"/> Winter Squash <input type="checkbox"/> Spaghetti Squash <input type="checkbox"/> Eggplant <input type="checkbox"/> Kale <input type="checkbox"/> Beets <input type="checkbox"/> Turnips <input type="checkbox"/> Swiss Chard <input type="checkbox"/> Leeks			
Restaurant Sign (1)		\$1.00	
Total of both columns			

Name _____ Farm Name _____

Address _____ City/State/Zip Code _____

Telephone _____ Email Address _____

SEND ORDER AND CHECK PAYABLE to the PA VEGETABLE MARKETING AND RESEARCH PROGRAM to the Program at 2301 N. Cameron St., Harrisburg, PA 17110-9408.

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1) HEAD TO THE FARMER'S TOOLKIT AT PAVEGGIES.ORG!

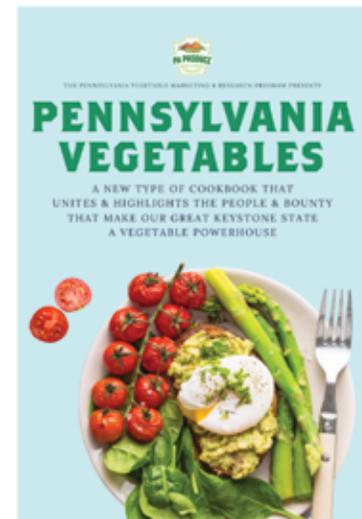
This year you can access a NEW MARKETING VIDEO that will teach you techniques and present you with tools for capturing new customers. Everyone's favorite graphics are still available, along with new designs and many more marketing resources to help boost your produce sales.



As always, contact the program if you have questions or can't find what you're looking for.

2) CONTRIBUTE TO THE PA VEGGIES E-COOKBOOK

The PVMRP, in collaboration with farmers, groups, organizations, and consumers, is creating an e-cookbook. *Pennsylvania Vegetables* will focus on enjoying seasonal goods in and around August and engage the entire Keystone State, inspiring Pennsylvanians to ooze with PA veggies pride, have fun in the kitchen, gather with friends, meet their farmers, and support the businesses and individuals who keep our local vegetable chain alive and well. The e-cookbook will be heavily promoted and receive a lot of exposure across Pennsylvania not just this year, but for many years to come. Please contact us or visit the URL below to submit your content if you would like to be a part of this unique, exciting and historical event!



[PAVEGGIES.ORG/CONTRIBUTE-TO-THE-PENNSYLVANIA-VEGETABLES-E-COOKBOOK/](https://www.paveggies.org/contribute-to-the-pennsylvania-vegetables-e-cookbook/)

3) BE THE FIRST TO KNOW ABOUT NEW TOOLS

- **EMAIL** pvmrp@embarqmail.com today to join the PA Veggies email list and receive helpful messages featuring valuable marketing tools, resources, and instructions.
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Better Together: Biologicals + Traditional Chemistries = Better ROI



Regalia® biofungicide is a key tank-mix partner for conventional chemistries, enhancing control of fungal diseases and delivering a better yield for growers.

Powdery mildew, shown here on beans, is a yield-reducing pest on many crops.
Photo: Daren Mueller, Iowa State University, Bugwood.org

MARRONE BIO INNOVATIONS'S REGALIA® biofungicide has been embraced by vegetable growers for some time as a reliable, effective solution for enhancing powdery mildew control. Steve Bogash, manager, Northeast, at Marrone Bio Innovations (MBI), previously served as an Extension agent at Pennsylvania State University. There, he performed a range of trials using Regalia® and traditional chemistries, consistently observing how the biofungicide (the active ingredient is a plant extract from *Reynoutria sachalinensis*) eliminated phototoxicity issues that greenhouses were experiencing when using only Mancozeb.

"Reviewing the research, we see this over and over again," Bogash says, adding that treating downy mildew on hops with a tank mix of Regalia® and Aliette resulted in better control than either product could accomplish alone.

The bottom line: Regalia® is an IPM staple that improves harvest quality and stimulates plant's innate ability to fight disease through induced systemic resistance (ISR) and systemic acquired resistance (SAR).

BIOLOGICALS SLOW RESISTANCE

Bogash cites numerous research reports that validate how tank-mixing biological solutions like Regalia® with traditional chemistries helps slow down or halt pathogen resistance. Studies performed in New York during winter 2019 in vine crops such as pumpkins and cucumbers showed chemistries like Torino or Quintec "fading" as powdery mildew became more resistant to these products, which growers rely on for control. Because these are single-mode-of-action materials, the fungus can eventually develop resistance to them.

"But if you add Regalia® and possibly MBI's Stargus® biofungicide, which have very different modes of action, to the tank you can preserve synthetic chemistries," Bogash says. "Growers can continue the products they've traditionally used and add these biologicals to decrease resistance."

BETTER RESULTS, EVEN WITH LOWER RATES

The economics make sense from a cost level as well; growers see a better ROI when they tank mix biologicals and traditional chemistries using the BioUnite platform. For example, a biological or chemistry used alone could require 2 or 3 quarts of material to be effective. But when you tank mix, you might be able to drop the rate to 1 quart, reduce the traditional chemistry and get a higher level of control Bogash says.



Regalia® biofungicide helps to stimulate plants' natural defenses against pathogens such as Septoria leaf spot.

Photo: Dr. Parthasarathy Seethapathy, Tamil Nadu Agricultural University, Bugwood.org

The tank mix displayed a "huge advantage," Bogash reports. After reviewing more than 300 studies that indicate similar results, Bogash says growers use less product, get better control, and realize improved yields by tank mixing biologicals and traditional chemistries in an integrated pest management (IPM) program. This is the core of MBI's BioUnite concept, which takes the guess work out of deciding how to tank mix the two types of materials.

"The tank mixes we recommend now provide reliable ways for growers to push off resistance, and increase disease control," Bogash says.

For example, copper is a longtime go-to for addressing fungal disease, including Septoria leaf spot on tomatoes. However, a tank-mix program alternating Regalia® + copper and Regalia® + Mancozeb delivers superior control.



The BioUnite concept takes the guesswork out of combining biological products with conventional chemistries, providing prescriptions for how to use both in an IPM program.



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Common Crops: Blueberry, Citrus, Cucurbits, Fruiting Vegetables, Grapes, Leafy greens, Medicinal Plants, Pome fruit, Potatoes, Strawberry, Tree Nuts



Regalia® Biofungicide Controls Bacterial Diseases
Increases crop performance by stimulating a plant's ability to fight diseases such as powdery mildew.

Common Crops: Almonds, Blueberries, Citrus, Cucurbits, Fruiting Vegetables, Grapes, Leafy Greens, Pome Fruit, Potatoes, Stone Fruit, Strawberries, Tobacco, Tree Nuts



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Common Crops: Blueberry, Citrus, Cucurbits, Fruiting Vegetables, Grapes, Leafy greens, Medicinal Plants, Pome fruit, Potatoes, Strawberry, Tree Nuts



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NEWS

Seasonal Vegetable Updates at the Revised Penn IPM Hotline

Penn State Extension is pleased to announce a major revision to its 1-800 PENN IPM hotline to better serve the horticultural and agricultural community.

Callers may now select from a greater number of integrated pest management and cultural practices topics. This is a toll-free service offered by Penn State specialists and educators with messages updated on a regular if seasonal basis.

The purpose of this hotline has always been to provide immediate access to current information in a brief but easy-to-access format. With this revision, Penn State Extension hopes to provide the same quality of timely reports available to recipients of its internet-based messages to those for whom receiving electronic communications is not an option.

Even so, 1-800 PENN IPM (1-800-736-6476) is available to everyone and will benefit those in situations where online access is not feasible, such as when scouting a field.

New to the service are lines dedicated to the production of popular vegetable crops and small fruits, to various aspects of tree fruit production, and to greenhouse IPM. Special-purpose lines addressing the Coronavirus pandemic and the PDA pesticide applicator license program have also been added. Penn State Extension also inaugurates a dedicated Spanish-language service, featuring selected messages from each of the major categories, translated for members of the Latinx community.

Long-time callers to 1-800 PENN IPM will already be familiar with how to operate the basic menu system: press a key on a phone's touch-tone keypad to hear a recorded message about a topic. The new system extends this simple method by providing

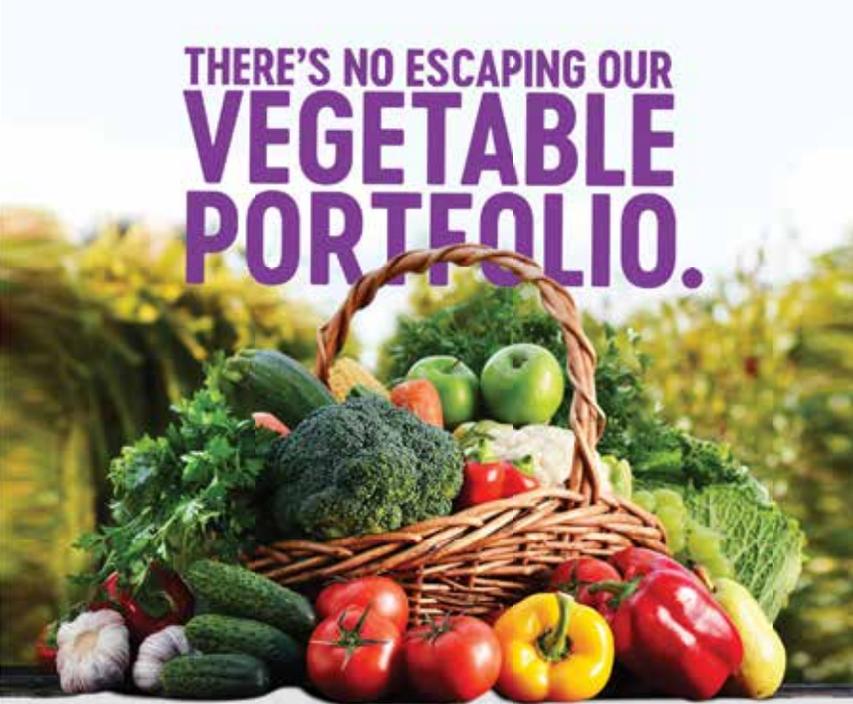
another layer of menu options to deliver more information than before. When a caller presses a key, one of two things happens: either a message from a specialist or educator begins to play, or the listener is given the choice of selecting one of several related options.

Example — Suppose a vegetable grower calls 1-800 PENN IPM. An introductory message provides information on all of the available options, including instructions to "Press 1" to hear messages on vegetables. So far, this reflects the previous behavior of the hotline and will be familiar to long-time users of the system.

The flexibility of the new layout comes to light after the caller presses that "1" key. Instead of just two pre-recorded messages for sweet corn and potato/tomato (which traditionally also included other crops), there is now the option to listen to an expanded menu of messages. This includes general production messages, as well as onion/Allium and vine crop updates.

Why is this a good thing? — The expanded menu now allows for additional time to cover important disease and pest issues for the most important vegetable crop groups. The caller will learn not only what to be scouting for but will hear additional information on best management practices to facilitate timely management decisions. The messages are typically updated weekly during the production season and more frequently if needed.

A table listing the set of options is provided on the next page. You may also download the 1-800 PENN IPM Cheat Sheet to print out for quick reference.



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NEWS

Subject	Key(s)	Description
Vegetables	1	Updates for commercial vegetable production.
General	1	Messages applicable to general vegetable production.
Onion & Allium	2	Specific to Allium production.
Tomatoes & Potatoes	3	Specific to tomato/potato production.
Sweet Corn	4	Sweet corn pest updates.
Vine Crops	5	Pumpkins, squash, other cucurbits and vines
Previous menu	(star) *	Returns to the previous menu.
Greenhouse IPM	2	Updates for commercial greenhouse IPM.
Coronavirus Tips	3	Coronavirus updates for produce growers.
Small Fruit	4	Commercial small fruit production (all kinds).
Tree Fruit	6	Commercial tree fruit industry main menu.
Pathology	1	Tree fruit pathology updates.
Entomology	2	Tree fruit entomology updates.
Physiology/Horticulture	3	Tree fruit physiology/pomology updates.
General	4	Current tree fruit industry issues.
Directory	8	A brief directory of specialist & educator contact numbers.
FREC	0	Transfer to the Fruit Research and Extension Center.
Previous menu	(star) *	Returns to the previous menu.
Private Applicator License Update	8	Information about the PDA pesticide applicator license process.
Spanish-Language Translations	9	Updates in Spanish.
Vegetables	1	Messages applicable to general vegetable production.
Greenhouse IPM	2	Messages applicable to greenhouse growing.
Small Fruit	4	Messages applicable to general small fruit production.
Tree Fruit	6	Messages applicable to general tree fruit production.
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VEGETABLE PRODUCTION

PA Vegetable Current Issues

Beth Gugino, and Shelby Fleischer in consultation with Penn State Extension Educators

General conditions and observations: As the crops mature and the weather becomes warmer, we start to see a shift in pests and diseases as well as environmental issues. There have been several reports of stem damage (aka 'plastic burn') on tomato, pepper and eggplant resulting from transplanting fragile transplants into hot black plastic. The extreme heat in parts of the state

last week also caused leaf curling on some tomato cultivars. Tomato cultivars react differentially to heat stress with some curling more than others although this typically does not lead to yield loss. And although not weather related, there have been an increasing number of nutritional issues related to excessive fertility. Even when contracting out the nutritional management of your crop, it is important to still understand what your crop nutritional needs are and how they are being met. You can have too much of a good thing.

Onions and other Alliums

The recent high temperatures in the upper 80's and 90's °F along with scattered strong storms have led to increased **bacterial disease problems in onion fields** in central and southeastern PA. The most obvious symptom of center rot is a single interior bleached and wilted leaf (pictured right). The bacteria were likely already associated with these plants earlier in the season and then change in environmental conditions led to symptom development. Regular weekly applications of a copper-based fungicide tank mixed with mancozeb (7-day PHI on onion) will protect the plant tissues from bacterial splash dispersed by rain. The high temperatures have also led to increased thrips pressure.

Also keep an eye out for **Stemphylium leaf blight** and **purple blotch**. These are the two most common fungal diseases of onion in our region. More information on identification and management to come in this week's vegetable disease update.

Field Production Update

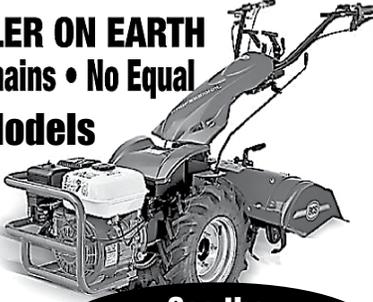
In general, this season the movement of **cucurbit downy mildew** has been slower due in part to drier conditions that occurred in the southeastern U.S. in late April and May. However, as coastal storms become more common, the disease is now starting to move up along the east coast with several reports in South Carolina and one report as far north as North Carolina. All reports to-date have been on cucumber. Cucumber and muskmelon are typically the first crops to develop downy mildew and fungicide applications are our primary management tool. Also be on the lookout for **powdery mildew** in cucurbits especially as the crop begins to fruit. Fungicides are most effective when applied at the onset of disease (1 powdery mildew lesion/ 50 leaves). Be sure to check the undersides of the leaves where symptoms are apt to develop first.

Several insect pests are showing up relatively early or in high numbers for this time of year, which may reflect higher than normal overwintering survival, either within PA, or in areas close to PA. Examples include high **corn earworm** counts in the DelMarVa, strong **striped cucumber beetle** pressure, and first sightings of **squash bug**. Although corn earworm counts within PA are very low, the moths will be strongly attracted to tasseling and silking corn. Corn earworm is also a pest of hemp. Pyrethroid resistance can be a significant problem with corn earworm, and usually resistance starts low, possibly

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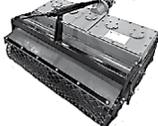
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VEGETABLE PRODUCTION

Squash bug usually first appears in July, but first sightings occurred in June. Controls are most effective if applied prior to canopy closure. Photo credit: N. Sloff.



Characteristic symptoms of center rot of onion. Photo credit: Beth Gugino.



because the fraction of the population that harbors resistance does not overwinter as well as the fraction that does not harbor resistance. However, early reports are suggesting higher than normal rates of pyrethroid resistance in corn earworm. Scout for squash bug eggs or nymphs and apply controls if needed prior to canopy closure. Be on the lookout for **aphids**, **mites**, **thrips** and **potato leafhopper** on vegetable crops near newly harvested hay fields or fallow fields that dry down during hot weather: these pests will move into irrigated vegetable crops if the host they are on senesces or is cut. Aphids and thrips can not only directly damage certain crops, but they are vectors of viruses, and striped cucumber beetles and squash bugs can vector bacterial pathogens. Some reports are coming in of transplants harboring mites.

Special Note: Pesticide Applications in Enclosed Spaces

When it comes to making pesticide applications, the Pennsylvania Department of Agriculture has updated and broadened the term "greenhouse" to an "enclosed space" which now includes high tunnels, greenhouses, and hoop houses. Per 40 CFR Part 170 enclosed space production is the production of agricultural plants indoors or in a structure or space that is covered in whole or in part by any nonporous coverings and is large enough to permit a person to enter.

Situations that would still be considered enclosed spaces:

- A hoop house cover with plastic film, regardless of the sides being rolled up or down.
- A greenhouse with the roof vented.
- A high tunnel with both ends open.

Situations that would not be considered enclosed spaces:

- A hoop house with all plastic film completely removed; for example, it is common to remove plastic film for summer production.
- A hoop house with a shade cloth where the plastic film traditionally would be.
- A tunnel, such as a low tunnel, that is not tall enough for a person to enter.

When selecting pesticides to manage pest and disease outbreaks in enclosed structures, only products that are labelled for use in greenhouses/enclosed structures on that crop group can be applied. If the label specifically restricts applications in the greenhouse/enclosed spaces, you are not permitted to apply it. Also, if the label does not specifically include or exclude greenhouse/enclosed spaces (no mention at all), you are not permitted to apply it. Questions can be directed to Jessica Lenker, jeslenker@pa.gov, 717-772-5217.

Resources for Staying Up to Date with the Latest Information

- **Sign-up with Penn State Extension** to receive the latest news and information on vegetable and small fruit crop production as well as pest and disease management either electronically or by USPS (1-877-345-0691).

- **Cucurbit downy mildew alerts** can be obtained by email or text message by signing up at <https://cdm.ipmpipe.org/alerts/>. You can specify the distance from your farm for which you would like to receive reports. NOTE: If you signed up for alerts in a previous to 2020 then you will need to sign-up again due to a website upgrade.
- **The 2020-2021 Mid-Atlantic Fruit and Vegetable Production Recommendations** contains the latest information to help commercial vegetable growers in the mid-Atlantic regional make production and pest management decisions. The hardcopy can be purchased either online or by calling 1-877-345-0691. Individual sections are also available for download here. This publication will now be updated every other year so the next update will be in 2022.

The authors are extension specialists at Penn State Univ. From Penn State Extension, June 2 and 16, 2020.

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VEGETABLE PRODUCTION

Be on the Lookout for Issues in Greenhouse and High Tunnel Tomatoes

Thomas Ford

After a cold, dreary spring, the weather is starting to improve. This means we need to be watching for issues in the greenhouse and high tunnels and develop a scouting plan to monitor problems.

In this article, we will talk about some common problems and their management in greenhouse and high tunnel tomatoes.

Blossom End Rot in Greenhouse and High Tunnel Tomatoes

On the plant nutrition front growers are receiving their first plant analysis results back and are finding that the calcium levels in the tomato and pepper tissues are lower than desired. The low levels of calcium in the plant tissues can be easily explained by the cool, gray humid, weather that has been blanketing our area this spring which limited both transpiration rates and calcium uptake.

Historically many researchers have focused on localized calcium deficiencies in tomato and pepper plants as a precursor to developing Blossom End Rot in tomatoes and peppers. While this has been the operating premise for most of my career, there seems to be new research that may encourage a totally different management approach in preventing Blossom End Rot in the greenhouse.



Figure 1: Blossom End Rot (BER) occurs because of plant stress. Photo: Tom Ford, Penn State

Plant stress and growth spurts in the greenhouse appear to divert calcium away from developing fruits resulting in Blossom End Rot. If growers can minimize plant stress and do not over-fertilize or over-stimulate their plants (bullish growth versus toned growth) less blossom end rot may be observed.

Two researchers, Lim C. Ho and Phillip J. White (A Cellular Hypothesis for the Induction of Blossom-End Rot in Tomato Fruit, 2005) stated that direct application of calcium sprays to developing fruit would reduce the incidence of Blossom End Rot (BER) in tomato fruits. Other researchers have found that the application of calcium sprays to developing tomato fruits were very labor-intensive, did not reduce the incidence of BER, and actually decreased the number of marketable fruits. While growers can consider on-farm experimentation with foliar calcium products their usage does not appear to be the panacea that we once thought it was. In summary, the best ways to prevent blossom end rot in greenhouse tomatoes are:

- Monitor soil or media salinity. Elevated soluble salt levels increase plant stress and with stress comes an increase in BER incidence.
- Monitor moisture levels and do not let the media or soil get too dry between watering and/or let it become waterlogged. Remember stress = BER.
- Limit plant growth spurts. Excessive or bullish growth increases the incidences of BER.
- Reduce light intensity under periods of high light (summer) to reduce plant stress (Consider 30% shade cloth).
- Maintain moderate humidity levels with good airflow.

Thrips in Greenhouse Tomatoes

Thrips seem to be a problem every year, but the stakes get much higher when there are weeds or floriculture crops in the greenhouse with tomatoes. Many weeds and annual flowers can be reservoirs for tomato spotted wilt virus (TSWV). If thrips feed on infected weeds or plant materials and then feed on tomatoes they can readily transmit TSWV virus to your tomato crop.

While virus transmission is the greatest threat posed by thrips their feeding can cause a golden "flecking" of the tomato fruit that impacts its visual appeal to customers. Western flower thrips should be a grower's greatest concern since they have the capacity to transmit TSWV. Recommended bio-control agents in tomato greenhouses include: *Strateolaelaps scimitus*, minute pirate bugs (*Orius spp*), and *Neoseiulus cucumeris*.

Mycointsecticides containing *Beauveria bassiana* (BotaniGard, Mycotrol), *Isaria fumosoroseus* strain FE 9901 (NoFly WP), and *Metarrhizium anisopliae* can be used for thrips control on tomatoes. Labeled chemical insecticides for use on greenhouse tomatoes include insecticidal soap (M-Pede), paraffinic oil (Ultra-Fine Oil), chlorfenapyr (Pylon), and azadirachtin (Azatin).

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Tomato Pinworms in Greenhouse and High Tunnel Tomatoes

Tomato pinworms were detected in a tomato greenhouse in the western part of the state. It is believed that tomato pinworm pupae (from last summer) overwintered in the greenhouse and began attacking the tomato plants shortly after they were transplanted in the greenhouse.

The larva of the tomato pinworm is a small orange-brown to a purplish-black caterpillar that can produce a blotch-like mine on the leaves or tunnel slightly under the skin of the tomato fruit. If left uncontrolled this pest can produce 4-5 generations a year resulting in both defoliation and fruit damage. After feeding the



Figure 2: Thrips feeding on the edge of tomato. Photo: Tom Ford, Penn State

VEGETABLE PRODUCTION

tomato pinworm larva will drop to the ground and will pupate at or near the soil surface.

Growers wishing to manage tomato pinworm should consider using mating disruption (NoMate TPW) or light traps. *Trichogramma* spp. have also been used in Canada as a bicontrol agent with some success. Insecticides labeled for Tomato Pinworm management in greenhouses include spinosad (Entrust SC), chlorfenapyr (Pylon), or cyantraniliprole (Exirel).



Figure 3: Tomato pinworms cause blotch mines to appear on infested tomato leaves. Photo: Tom Ford, Penn State

Botrytis in Greenhouse and High Tunnel Tomatoes

Cloudy, damp, gray weather that extends drying times and limits airflow is a recipe for Botrytis or gray mold. Common symptoms observed by growers include tan or brown lesions on leaves, brown cankers on stems, and blighted flowers. Under moist or humid conditions, a grower will notice a gray fuzzy bread-mold like growth on blighted plant parts including flowers, leaves, and stems. Botrytis management starts with limiting high humidity and leaf wetness in the greenhouse or high tunnel.



Figure 4: Botrytis or gray mold infections are the most severe under cloudy, wet conditions. Photo: Tom Ford, Penn State

Horizontal airflow fans (HAF) are a grower's best friend in warding off botrytis. Unfortunately, as I visit greenhouses around the state, I frequently encounter unplugged or missing HAF fans in some greenhouse operations. These fans are critical in moving the moist air out of the crop canopy and away from foliage, stems, and flowers.

High tunnels rely on natural ventilation to remove humidity and to dry the dew off the foliage. Due to our colder temperatures, growers have had to keep their high tunnel sides rolled down for extended periods of time which has created the perfect environment for botrytis outbreaks. High tunnel growers do not have a lot of alternatives when cooler weather limits natural ventilation. One possible solution being touted by some growers is to walk down the rows in the early morning and use a leaf blower to blow off some of the dew that is coating the foliage. While this is an added expense it may be a realistic option for growers that are faced with an abundance of cool, cloudy, wet weather.

Venting at sunset to evacuate moisture-laden air from greenhouses is often overlooked as a technique to reduce botrytis infection. Heating the cooler air drawn in from outside the greenhouse will lower humidity at night resulting in a growing environment that is less conducive to botrytis infection.

Plant debris can be a source of inoculum for botrytis infection. The removal of blighted foliage and flowers from the tomato plants will reduce the inoculum resulting in less infection. Growers should remove blighted foliage and flowers on warm, sunny dry days to lessen the likelihood of fresh wounds becoming infected from windblown spores.

Fungicides can be an effective tool in preventing and/or managing botrytis in the greenhouse. Fungicide resistant biotypes are common so growers must rotate FRAC (Fungicide Resistance Action Committee) codes to prevent resistant strains from developing. Chemical fungicides labeled for use on greenhouse and high tunnel tomatoes include Scala SC, Decree 50 WDG, Badge SC, etc. Bio-based fungicides can be a great alternative to chemical fungicides if resistance is noted in the greenhouse. Products like *Bacillus subtilis* (Cease), *Streptomyces griseoviridis* (Mycostop), *Streptomyces lydicus* (Actinovate), and Extract of *Reynoutria sachalinensis* (Regalia PTO) can be utilized with most conventional chemical fungicides to provide control.

Mr. Ford is with Penn State Extension in Cambria County. From Penn State Extension, <https://extension.psu.edu/be-on-the-look-out-for-issues-in-greenhouse-and-high-tunnel-tomatoes>, June 1, 2020.



Figure 5: Botrytis can colonize fresh wounds on cloudy gray days. Photo: Tom Ford, Penn State

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VEGETABLE PRODUCTION

Managing Cucurbit Powdery Mildew Successfully in 2020

Margaret Tuttle McGrath

Effectively managing powdery mildew is essential for producing a high-quality cucurbit crop. This foliar, fungal disease is common wherever cucurbits are grown, including in the northeastern U.S. This is because the pathogen produces an abundance of asexual spores (the powdery growth) easily dispersed by wind, thus it can spread widely, and the pathogen can produce a sexual spore in fall that enables it to survive over winter. Leaves affected by powdery mildew die prematurely which results in fewer fruit and/or fruit of low quality (prone to sunscald, poor flavor, poor storability).



Powdery mildew on squash. Photo: UMass Vegetable Program

Powdery mildew is managed with resistant varieties and fungicides. An integrated program with both management tools is the best approach for achieving effective control because the pathogen is adept at evolving new strains resistant to individual tools such as resistant varieties or a specific conventional fungicide. It is more difficult for new pathogen strains to develop when an integrated program is used, and effective control is more likely. Powdery mildew management program often needs adjustments as the pathogen and management tools change.

Resistant Varieties — Resistant varieties are now available in most crop groups with new varieties released most years. Resistance in cucumber is standard in modern varieties and is so strong it is easy to forget this cucurbit type is susceptible until an Heirloom type is grown. Watermelon is infrequently affected in the northeast. Resistance in other cucurbit types is not adequate used alone (without fungicide applications) to prevent impact of powdery mildew on yield. Tables of resistant varieties are at <http://vegetablemendonline.ppath.cornell.edu/Tables/TableList.htm>

Fungicide program — The most important component of an effective management program for powdery mildew is an effective fungicide program. The challenge is getting fungicide to the lower surface of leaves where the pathogen develops best. Most fungicides approved for organic production have contact activity. Sulfur and oil have demonstrated some ability to control powdery mildew on the lower surface indicating some ability to redistribute. Sulfur is volatile. For conventionally managed crops there are mobile fungicides able to move through leaves with targeted activity for powdery mildew. Because these fungicides have targeted activity, they are prone to resistance development and additional fungicides must be added to the program when there is a need to manage other diseases such as downy mildew and Phytophthora blight.

For conventionally managed crops, alternate among targeted, mobile fungicides and apply them with a protectant fungicide to manage resistance development and avoid control failure if resistance occurs, and also to comply with label use restrictions (most mobile fungicides are not permitted used exclusively). The powdery mildew pathogen has a long history of developing resistance to fungicides (it was the first occurrence of resistance in the U.S.), thus a diversified fungicide program applied to resistant varieties when possible is critical for success. Always implement a resistance management program; do not wait until there is a problem. The goal is to delay development of resistance, not manage resistant strains afterwards.

When to apply fungicides — The action threshold for starting applications is one leaf with symptoms out of 50 older leaves examined. Examine both surfaces of leaves. Starting treatment after this point will compromise control and promotes resistance development. Powdery mildew usually begins to develop around

the start of fruit production. Protectant fungicides applied before detection will slow initial development. After detection, continue applying fungicides weekly. Conditions are favorable for powdery mildew throughout the growing season; this pathogen does not need a period of leaf wetness to infect.

Recommended targeted fungicides

— Alternate among targeted, mobile fungicides primarily in the following three chemical groups, plus apply with protectant fungicide to manage resistance development and avoid control failure if resistance occurs, and also to comply with label use restrictions. All targeted fungicides are at risk of resistance developing; FRAC Code 50 and U13 are the only chemistries that resistance has not yet been detected to. Labels are available at: <http://www.cdms.net/Label-Database>.

Vivando (FRAC Code 50, formerly U8) has exhibited excellent control in fungicide evaluations. Activity is limited to powdery mildew. It is recommended used with a silicon adjuvant. Do not mix with horticultural oils. It can be applied three times per year with no more than two consecutive applications. REI is 12 hr. PHI is 0 days. Prolivo is a new fungicide with a new active ingredient in this FRAC group as of 2018. It was not as effective as Quintec for managing powdery mildew on lower

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leaf surfaces in a fungicide evaluation conducted at LIHREC in 2016 in which Vivando was not included.

DMI fungicides (FRAC Code 3) include Proline*, Procure, Luna Experience*†, and Rhyme*† (these considered most effective) plus Aprovia Top*, Inspire Super*, Mettle, and Rally. Resistance is quantitative. Highest label rate is recommended because the pathogen has become less sensitive to this chemistry. Efficacy has varied in fungicide evaluations. Proline is thought to have the greatest inherent activity. Procure applied at its highest label rate provides a higher dose of active ingredient than the other Code 3 fungicides. Five applications can be made at this rate. REI is 12 hr for DMI fungicides. PHI is 0 days for some including Procure; 7 days for others including Proline. Inspire Super (FRAC Code 3 and 9) is recommended for other labeled diseases. It is expected to provide some control of powdery mildew, but there are other FRAC 3 fungicides with greater intrinsic activity for powdery mildew that are better choices when this is the only disease developing. TopGuard is labeled but not recommended because it has Code 11 ingredient plus same DMI ingredient in Rhyme. *Fungicides labeled for additional cucurbit diseases; see section on other diseases.

Gatten (FRAC Code U13) is the newest fungicide; it was introduced in 2018. REI is 12 hr. PHI is 0 days. Activity is limited to powdery mildew. It can be applied five times. It was as effective as Vivando for managing powdery mildew on lower leaf surfaces in a fungicide evaluation conducted at LIHREC in 2019 but not in 2018.

Recommended used sparingly:

Quintec (FRAC Code 13) was consistently effective in fungicide evaluations conducted on Long Island until 2019 when it was significantly less effective than Vivando for the first time in

the fungicide evaluation conducted annually on Long Island. This was not surprising because insensitivity to a high concentration of Quintec (similar to the dose when applied in the field) has been detected in some pathogen isolates collected from commercial fields and/or fungicide-treated research fields at the end of the growing season on Long Island since 2015. Resistant isolates evidently were sufficiently uncommon most of the season in 2015-2018 not to impact Quintec efficacy. Because resistance has developed, Quintec is now recommended to be used less than the label permits, which is a crop maximum of four applications. Apply no more than twice consecutively. Activity is limited to powdery mildew. It is the only mobile fungicide that does not move into leaves: it redistributes to foliage where spray was not directly deposited, including the underside of leaves, through diffusion and a continual process of absorption and desorption in the cuticular waxes of foliage. Labeled for use on non-edible peel crops: melons, pumpkin, and winter squash. REI is 12 hr. PHI is 3 days.

Carboxamide aka SDHI fungicides (FRAC Code 7) include Luna fungicides, Aprovia Top, Miravis Prime, Fontelis, Endura, Pristine, and Merivon. Last two also contain the same QoI fungicide (Code 11), which is no longer effective for powdery mildew. Resistance to boscalid, the FRAC Code 7 active ingredient in Endura and Pristine has been detected routinely on Long Island since 2009 and likely is the reason their efficacy has varied in fungicide evaluations. Full cross resistance was documented between several carboxamides, including those in Pristine, Merivon and also Fontelis, but not Luna fungicides, through laboratory assays conducted with pathogen isolates resistant and sensitive to boscalid.

Continued on page 28

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VEGETABLE PRODUCTION

Avoiding Blossom End Rot

Gordon Johnson

Variable June weather often creates conditions favorable for blossom end rot in susceptible crops, with tomatoes and peppers being the most affected. In most years, there is a transition point in June where temperatures move from the moderate side to an extended hot period with temperatures in the 90s. This is also when many tomatoes and peppers have reached full plant size with high water demand and have large numbers of flowers and developing fruit with heavy calcium demand.

While field tomatoes are not near this stage yet, high tunnel tomatoes are susceptible. We are seeing days in the 90's and high tunnel tomatoes will have high water demand.

Blossom End Rot (BER) is a disorder where developing fruits do not have enough calcium for cell walls, cells do not form properly, and the fruit tissue at the blossom end collapses, turning dark in color. Calcium moves through cation exchange with water movement in the fruit, so the end of the fruit will be the last to accumulate calcium. Larger fruits and longer fruits are most susceptible. With fruits, the rapid cell division phase occurs early in the development of the fruit and if calcium accumulation in the fruit is inadequate during this period, BER may occur. While it may not

be noticed until the fruit expands, the deficiency has already occurred and cells have already been negatively affected. We most commonly see signs of blossom end rot on fruits two weeks after the calcium deficiency has occurred.

Understanding blossom end rot also requires an understanding of how calcium moves from the soil into and through the plant. Calcium moves from the soil exchange sites into soil water and to plant roots by diffusion and mass flow. At plant roots, the calcium moves into the xylem (water conducting vessels), mostly from the area right behind root tips. In the xylem, calcium moves with the transpirational flow, the movement of water from roots, up the xylem, and out the leave through stomata. Calcium is taken up by the plant as a divalent cation, which means it has a charge of +2. It is attracted to negatively charged areas on the wall of the xylem, and for calcium to move, it must be exchanged off the xylem wall by other positively charged cations such as magnesium (Mg⁺⁺), potassium (K⁺), ammonium (NH₄⁺), or additional calcium cations (Ca⁺⁺). This cation exchange of calcium in the xylem requires continuous movement of water into and up through the plant. It also requires a continuous supply of calcium from the soil.

Continued on next page

Managing Cucurbit Powdery Mildew Successfully in 2020 *continued from page 27*

However, Luna Sensation has exhibited limited control in fungicide evaluations conducted in 2017-2019 at LIHREC. Luna Experience is the best choice because it also contains tebuconazole (Code 3), which needs to be considered when developing an alternation program. Luna Sensation is not recommended because it also contains trifloxystrobin (Code 11); resistance to this chemistry is very common. Aprovia Top, Luna Experience, and Miravis Prime are the only Code 7 fungicides recommended. Limit use. Aprovia Top and Luna Experience have the advantage that they contain a second active ingredient with activity for powdery mildew (Code 3). All have 12 hr REI. PHI is 0, 7, and 1 day respectively. Maximum number of applications is 2-5, depending on product and rate. Low rate isn't recommended.

Recommended used sparingly if at all:

Torino (FRAC Code U6) exhibited excellent control in fungicide evaluations until recently. It failed in an experiment in North Carolina in 2016 and at LIHREC in 2017, where resistance to Torino was detected in pathogen isolates. Torino resistance was also detected in 2018. Activity is limited to powdery mildew. It can only be applied twice to a field in a 12-mo period. Consecutive applications are not recommended. REI is 4 hr. PHI is 0 days.

No longer recommended. Resistant pathogen strains are sufficiently common to render the following fungicides ineffective: Topsin M (FRAC Code 1; MBC fungicide), Qol fungicides (Code 11), which include Quadris, Cabrio and Flint, and SDHI fungicides (Code 7) containing boscalid (Endura and Pristine) or an active ingredient that has exhibited full cross resistance in laboratory testing of pathogen isolates (Merivon). Resistant strains continue to be detected very commonly every year on Long Island where monitoring is being conducted.

Recommended protectant fungicides — Many fungicides have contact activity for powdery mildew; mancozeb is an exception. They include chlorothalonil, sulfur, copper, mineral oil, and several biopesticides. Sulfur is one of the most effective and least expen-

sive products. Its activity is limited to powdery mildew, thus it is especially useful early in disease development when other diseases are not a concern, including as a preventive application. Micro-encapsulated formulations are recommended. Melons are sensitive to sulfur especially when hot; there are PM-tolerant varieties.

Fungicides Labeled for Other Diseases in Addition to Powdery Mildew.

- Proline (FRAC 3). Fusarium blight and gummy stem blight.
- Rhyme (FRAC 3). Gummy stem blight.
- Luna Experience (FRAC 3 and 7). Alternaria leaf spot, anthracnose, gummy stem blight, and belly rot.
- Aprovia Top (FRAC 3 and 7). Anthracnose, Alternaria leaf blight, gummy stem blight, and Plectosporium blight.
- Inspire Super (FRAC 3 and 9). Alternaria leaf blight, anthracnose, gummy stem blight, Plectosporium blight, and Septoria leaf spot
- Miravis Prime (FRAC 3 and 12). Alternaria leaf blight and spot, gummy stem blight, and scab.

In summary, to manage powdery mildew effectively in cucurbit crops:

1. Select resistant varieties,
2. Inspect crops routinely for symptoms beginning at the start of fruit development, and
3. Apply targeted fungicides weekly with protectant fungicides and alternate amongst available chemistry based on FRAC Group code, starting at the action threshold of 1 affected leaf out of 50 older leaves. Add new fungicides to the program when they become available; substitute new for older product if they are in the same FRAC group.

Please Note: The specific directions on fungicide labels must be adhered to – they supersede these recommendations, if there is a conflict. Check labels for use restrictions. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

*Dr. McGrath is with Cornell University at the Long Island Horticultural Research and Extension Center. From **Vegetable Notes for Vegetable Farmers in Massachusetts**, Univ. of Mass. Extension, Vol. 32, No. 12, June 11, 2020.*

VEGETABLE PRODUCTION

In general, most soils have sufficient calcium to support proper plant growth. While proper liming will ensure there is adequate calcium, it is not the lack of calcium in the soil that causes blossom end rot in most cases. It is the inadequate movement of calcium into plants that is the common culprit. Anything that impacts root activity or effectiveness will limit calcium uptake. This would include dry soils, saturated soils (low oxygen limits root function), compaction, root pathogens, or root insect damage. In hot weather on black plastic mulch, roots can also be affected by high bed temperatures. Low pH can also be a contributing factor. Calcium availability decreases as pH drops, and below a pH of 5.2 free aluminum is released, directly interfering with calcium uptake. Again, proper liming will ensure that this does not occur. Applying additional calcium as a soil amendment, above what is needed by normal liming, will not reduce blossom end rot.

In the plant, there is a "competition" for calcium by various plant parts that require calcium such as newly forming leaves and newly forming fruits. Those areas that transpire the most will receive more calcium. In general, fruits have much lower transpiration than leaves. In hot weather, transpiration increases through the leaves and fruits receive lower amounts of calcium. High humidity will reduce calcium movement into the fruit even more. Tissue tests will often show adequate levels of calcium in leaf samples; however, fruits may not be receiving adequate calcium. In addition, in hot weather, there is an increased risk of interruptions in water uptake, evidenced by plant wilting, when transpirational demand exceeds water uptake. When plants wilt, calcium uptake will be severely restricted. Therefore, excess heat and interruptions in the supply of water (inadequate irrigation and/or rainfall) will have a large impact on the potential for blossom end rot to occur. Proper irrigation is therefore critical to manage blossom end rot.

As a positive cation, there is "competition" for uptake of calcium with other positive cations. Therefore, if potassium, ammonium, or magnesium levels are too high in relation to calcium, they can reduce calcium uptake. To manage this, do not over-fertilize with potassium or magnesium and replace ammonium or urea sources of nitrogen with nitrate sources.

Applying additional soluble calcium through irrigation, especially drip systems, can reduce blossom end rot to some degree if applied prior to and through heat events and if irrigation is applied evenly in adequate amounts. Foliar applications are only partially effective when applied to very young developing fruit. Fruits do not absorb much calcium, especially once a waxy layer has developed, and calcium will not move from leaves into the fruit (there is little or no phloem transport). Foliar applications of 2-4 lb Calcium (Ca) per acre is recommended. Foliar calcium can be applied as calcium chloride at the rate of 5-10 lb per 100 gallons per acre, calcium nitrate at the rate of 10-15 lb per 100 gallons per acre, or chelated calcium at labeled rate.

In conclusion, the keys to controlling blossom end rot are making sure roots are actively growing and root systems are not compromised, soil pH is in the proper range, and irrigation is supplied in an even manner so that calcium uptake is not interrupted. Supplemental calcium fertilization will only marginally reduce blossom end rot if water is not managed properly.

*Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 28, Issue 12, June 5, 2020*

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VEGETABLE PRODUCTION

Vegetable Transplant Stunting

Gordon Johnson

Growers are reporting problems with stunted transplants. In some cases, plants appear to have abnormal growth with compressed internodes, "twisted" stems, or abnormally shaped leaves. In other cases, plants are not putting on any new growth. Transplant stunting can be caused by several factors during greenhouse production, during shipping and handling, during planting, and post planting.

Problems with Greenhouse Media

Each year there are some problems that arise with vegetable transplants related to issues with the growing medium. This is often seen as poor growth, yellow plants, or stunted plants. Greenhouse media manufacturers have good quality control measures in place but things can go wrong on occasion – inadequate mixing, critical components missing or in the wrong proportions (i.e. wetting agents, fertilizers, lime), or defective, poor quality components. Media can also be affected by poor storage and handling. Most commonly this occurs when it is stored outside and bales or bags get wet. In addition, media has a certain shelf life – old media often dries out and is hard to get rewetted.

When growers start filling trays, any media that does not handle well should be viewed as suspect and should not be used. Contact your supplier and have them inspect and run tests on the suspect media. Avoid using overly dry or caked media, media that is hard to loosen, media with a bad smell, water soaked media or media that is hard to wet.

Most media (but not all) will come with a starter lime and fertilizer charge. The fertilizer is designed to give about 2-3 week of nutrients. If the fertilizer is missing or improperly mixed or in the wrong proportion, seeds will germinate but seedlings will not grow much and will remain stunted. In this case, liquid fertilizer applications will need to be started soon after plant emergence.

Peat based media are acidic in nature and we generally can grow at lower pHs than soil. Plants will perform well from 5.4 to 6.4. Lime is added to peat based media and reacts over time after first wetting so pH will rise over time. Above 6.4 we often see iron deficiencies in transplants. This also occurs if irrigation water is alkaline (has high carbonates) causing pH to rise too high over time.

In high pH situations, to get transplant growth back to normal, use an acidifying fertilizer (high ammonium content) for liquid feeds. Use of iron products, such as chelated iron, as a foliar application on transplants can help them to green up prior to the pH drop with the acid fertilizer. In severe cases with very high media pH, use of iron sulfate solutions may be needed to more rapidly drop the pH. Acid additions to greenhouse irrigation water may also be considered for where water is alkaline.

If lime is missing or inadequate, and pH is below 5.2, plants may have calcium and magnesium deficiencies or may have iron or manganese toxicities. This also occurs in media that has been saturated for long periods of time. To correct this situation, apply a liquid lime solution to the media and water it in well. Calcium deficiencies will lead to damage to growing points and stunted and distorted plants.

Media that does not wet properly may not have enough wetting agent or the wetting agent may have deteriorated. They will be difficult to water and will not hold water well thus stressing plants. Application of additional greenhouse grade wetting agent may be needed.

If the initial media fertilizer charge is too high, or if too high of concentration of liquid fertilizer feed is used, or if incorporated slow release fertilizer "dumps" nutrients, high salt concentrations can build up and stunt or damage plants. Leaf edge burn, "plant burn", or plant desiccation will be the symptoms. Test the media

for electrical conductivity (EC) to see if salt levels are high. The acceptable EC will depend on the type of test used (saturated paste, pour through, 1:1, 1:2) so the interpretation from the lab will be important. If salts are high, then leaching the media with water will be required.

Problems with Transplants in Small Cell Sizes

More and more transplants are being grown in small tray cell sizes. These small size transplant plugs can become extremely root bound and may not put on new roots after transplanting. Another issue is when small cell transplants become waterlogged by overwatering. There will be limited oxygen to roots in this situation and plants may turn yellow and remain stunted. This is very common in peppers.

Problems Related to Transplant Height Control and Greenhouse Conditions

Growers use a range of techniques to manage transplant height in the greenhouse. This includes limiting phosphorus (P) fertilization, minimizing day-night temperature differentials, brushing plants, limiting water, and using plant growth regulators (limited for vegetable transplants). Each of these if not properly managed can cause long term stunting. Most growth regulators labelled for floral crops are not labelled for vegetables. Plants exposed to limited P may have a severe deficiency that will take several weeks to grow out of. Warm season transplants exposed to cold air can become yellow and be stunted because roots stop growing. This is particularly a problem near vent inlets and in hardening off areas. Plants that are overly water stressed drop leaves and take a long time to recover. Plants exposed to damage from heaters that are improperly venting exhausts into the greenhouse may suffer severe damage and show yellowing, distorted growth, and leaf drop. Diseases of roots, Pythium in particular, can be an issue, particularly when plants are placed directly on the ground (even if landscape fabric is in place). This can be a major source of plant stunting and transplant losses.

Herbicide Use in and Around Greenhouses

Transplant deformities and stunting can also occur when herbicides have been used to kill weeds in and around greenhouses. In the enclosed environment of a greenhouse, volatilization is enhanced and severe damage can occur from many common herbicides. Greenhouse vents and fans can draw in herbicides applied nearby also causing severe damage.

Problems During Shipping and Handling

With the bad weather, many growers received boxed transplants from southern sources but could not plant immediately. Plants that are shipped without trays (already pulled) or that are bare rooted that are packed tightly in boxes must be planted quickly. Delays will lead to plant deterioration, leaf loss, and potential disease buildup. Once transplanted, some of these plants may now grow out.

Planting and Plant Stunting

Transplants that are planted in extended cloudy periods may not grow well in the field, especially if plants have come out of the greenhouse after an overcast period. In years with cold, cloudy, windy weather after transplanting, we have had large losses of

Continued on page 35

BERRY PRODUCTION

Strawberry Anthracnose: Better Understanding and Management

Kathleen Demchak and Timothy Elkner

Strawberry Anthracnose Part 1: Better Understanding and Management

Anthracnose on strawberries is a recurring problem for Mid-Atlantic growers and is especially challenging to manage.

Dr. Mengjun Hu at the University of Maryland and Kathy Demchak at Penn State have been working to better understand the anthracnose situation in the region. Their work has included collecting diseased fruit and plants, using them to identify the fungal species present, and testing for fungicide resistance to improve management recommendations.

Hu identified four species that cause anthracnose crown, or fruit rot, from these samples. The most common species was also the one most commonly found in samples collected in the South and in California. In other studies, these species have been found on other crop plants, woodland plants, and common weeds such as pigweed and white clover, often without exhibiting symptoms. Complicating matters further, research has shown that controlling infected weeds with certain herbicides (glyphosate and paraquat) may trigger the fungi to sporulate, perhaps as a survival mechanism. Additionally, inoculum can also be transported on denim clothes and workers' hands. All of these factors make anthracnose especially challenging to manage.

Strawberry plants begin free of disease after they've been multiplied in tissue culture labs. However, as they spend time in the field, they are exposed to inoculum sources. Individual nurseries are trying very hard to keep plants clean and rotate fungicides to avoid resistance development. However, during the multi-season propagation process, some plants become infected and may arrive at your farm with anthracnose present, but without obvious symptoms. When conditions are right for disease development—warm and wet weather here in the eastern U.S.—symptoms will appear. Then all that is needed is splashing water from rain to bounce spores around on the plastic and to fruit in your planting bed, potentially turning a small infection into an epidemic.

Over time, it is very difficult to avoid exposure to inoculum. Because of multiple sources, various steps in the propagation process, and the need for fungicides to keep the disease at bay, plant material may be exposed to the same fungicide mode of action more times than is ideal. In our samples, Hu found widespread resistance to azoxystrobin, a category 11 fungicide that has been the mainstay of many fungicide programs. There is also resistance to other active ingredients within the same FRAC code.

With all of these concerns, what's a grower to do? First, be aware that healthy-looking plants may be infected without anyone knowing, so you should watch for symptoms of dark brown sunken lesions on petioles or leaf tissue, blighted blossoms, and wilting or dying plants.

Blighted flowers can look like those infected by *Botrytis*. You can pick a few affected blossoms and put them in a plastic bag in a cool location. After a day or two, those infected with *Botrytis* should exhibit the telltale grayish 'fuzzy' appearance of this disease. Berry caps and leaves infected with anthracnose have brown or black lesions with irregular margins (other diseases tend to have round spots) and round or elongated lesions on runners and leaf petioles as well. If conditions are right, small slimy orange spore masses may be seen in any of these lesions. Early fruit infection can show as hard, brown areas on green fruit with blackened seeds and as sunken areas without much color on maturing and ripe fruit.

As infections progress on ripe fruit, these areas will then turn dark brown with an orange or salmon center where spores are



Sunken area caused by anthracnose fruit rot on 'Monterey' fruit prior to development of orange spore masses. Photo: Kathy Demchak, Penn State Extension



Anthracnose causing blight of strawberry blossoms. Photo: Dr. Tim Elkner, Penn State Extension

being produced. Note that black seeds are very obvious when the fruit is infected with anthracnose, whereas seeds will remain a light color if infected with *botrytis*.

Second, some cultural controls should help such as keeping fields weed-free, using straw in row middles and tucked up under plants to reduce rainsplash, using good rotations, and managing row covers to avoid heat buildup under them. Berries infected with anthracnose should be removed from fields during harvest, and heavily infected areas should be harvested last to avoid spreading the disease.

Third, with a predicted return to seasonal temperatures, growers should focus on protecting developing fruit from anthracnose with an effective fungicide program. To avoid further resistance development, start with the protectant fungicides captan and thiram either alone as part of the rotation, or as a tank-mix partner with each spray application. Note that thiram has better efficacy against *Botrytis* but captan can do a much better job for anthracnose. Growers are limited to 5 applications of thiram per year (which has a 3-day preharvest interval), and 8 per year of captan if the maximum rate of captan is used.

Continued on next page

BERRY PRODUCTION



Green fruit showing black seeds and orange-salmon spores characteristic of anthracnose infection. Photo: Kathy Demchak, Penn State



Ripe strawberry fruit showing sunken area with black seeds indicating anthracnose infection. Photo: Kathy Demchak, Penn State



Anthracnose causing blackening of green fruit and blossom blight. Photo: Dr. Tim Elkner, Penn State Extension

Here are effective materials you can use for anthracnose that utilize different fungicide classes for resistance management.

- Check current labels to make sure any applications are allowable for your location and rotation restrictions are followed. Switch (group 9 + 12), and Oso/PhD (group 19) have received good ratings in the South.
- The category 3 products, difenoconazole, and propiconazole have shown very good efficacy against anthracnose based on lab testing. Inspire Super contains difenoconazole with cyprodinil (one of the active ingredients in Switch, so watch rotations if also using Switch).
- Various products such as Tilt, Protocol, and Bumper contain propiconazole. Note that other group 3 fungicides labeled for use on strawberries for other diseases are ineffective for anthracnose based on lab testing.
- Be cautious concerning the use of mixtures containing group 11 + 7 in particular, such as Pristine and Merivon Xemium. The possibility of resistance to the category 11 components means the products may be ineffective, as the category 7 components have little if any effect on anthracnose.

Strawberry Anthracnose Part 2: A Closer Look at Management and Fungicide Use

In Part 2, we take a closer look at some of the research results discussed in Part 1, and additional specific recommendations for management in Pennsylvania.

In the last few years, it became apparent that we needed a better understanding of the anthracnose fruit rot situation on strawberries in the mid-Atlantic region. Thanks to the availability

of molecular techniques, good University facilities, and engaged pathology personnel, we are making some significant progress.

Before we get to the results, we need to understand fungicide resistance as it pertains to anthracnose in particular. There is evidence that when we ship plant material around, we also ship around some disease inoculum, and some of it is resistant to certain fungicides. Research in Florida showed this was the case regarding resistant strains of *Botrytis*.

Even if you work to avoid resistance development on your farm, the resistant disease inoculum that may already be in the plants does not become less resistant over time—at least not in the case of our most common anthracnose species and the fungicide class to which it is most commonly developing resistance. This is because there is no evidence for a “fitness penalty” (i.e., no cost to the fungus) to be resistant, so there is no reason for it to change back to being sensitive to the fungicides we are using. On the other hand, when we spray fungicides, we are always pressuring the fungi to become more resistant to those fungicides.

Rotating chemical classes preserves the effectiveness of a fungicide’s mode of action. When you use a fungicide that acts on one particular fungal process, some fungal strains may emerge that are resistant to that chemical, but if you then use a fungicide with a different mode of action, the resistant fungi are wiped out in some other way. Multi-site fungicides act on a fungus in multiple ways. Eventually, resistance could still emerge, but its development is much less likely. If the resistance situation is an unknown, it would be wise to include a multi-site fungicide in the tank when using a single-site fungicide.

Over the past year, 200 isolates of *Colletotrichum*, the genus of the fruit and crown-rotting organisms that cause anthracnose, were analyzed. These had been collected from North Carolina to Pennsylvania over the past few years. Forty of these isolates were collected in 2019 from Pennsylvania farms that used different cultivars, plant sources, and production systems. When we took a close look at just these isolates, some interesting trends emerged. We do need to keep in mind that this was only 40 isolates—this is a very small number for our state where production is very diverse, and we definitely need to collect more data in the summer of 2020 to solidify any conclusions. However, this information may help in guiding fungicide programs this year, so we felt it was important to discuss this now.

Looking at the results for Pennsylvania samples collected in 2019 (and note, we’re talking about only the isolates obtained from PA farms at this point), two fairly obvious trends regarding resistance emerged.

The first was that the isolates collected from the varieties that are the most susceptible to fruit anthracnose (“California varieties”, in particular, ‘Chandler,’ ‘Camarosa’, ‘Albion’, ‘San Andreas’,

Continued on next page

BERRY PRODUCTION

Strawberry Anthracnose Part 2: A Closer Look at Management and Fungicide Use

continued from page 32

‘Seascape’) were frequently resistant to azoxystrobin (the active ingredient in Abound), a category 11 fungicide. We cannot, however, sort out the varieties from plant material origin at this point, as the plant material of these varieties largely originated from either southern propagators or California nurseries. So, is this a variety effect, or a plant source effect? We really don’t know.

The second interesting trend was that isolates obtained from “eastern” varieties and from nurseries where plant material was limited in its travels, were much more likely to be sensitive to azoxystrobin. Again, the variety effect, or plant source effect? We don’t know. What we do know though, is that we can’t rest on our laurels regarding resistance development with strains isolated from these plants either, as some resistance was found there, too.

Hindsight is 20-20 of course, and how this might have unfolded seems obvious now. Susceptible cultivars need to be sprayed more often than others. If they are sprayed over a period of decades (even if only a few times a year with a particular fungicide class), and with a fungicide that has a single site mode-of-action, resistant strains develop. We knew that could happen already, right? Add to this the fact that these varieties that are very susceptible to anthracnose also probably have been producing relatively more inoculum, and we are selecting for resistant strains every time we spray. The only surprise in all of this perhaps is that our fungicides work for as long as they do.

We knew the theories, but to what extent resistance development was happening was really a black box until we had the tools to see what was going on. While the resistance tests mentioned above were done with azoxystrobin, there is known cross-resistance to other fungicides in the category 11 fungicide class, so they are at risk, too. We don’t want to lose them when they do work, nor do we want to lose the companion active ingredients that are often included with them in pre-mixes.

It is probably safe to assume that your plants were exposed to some inoculum sources and that they picked up at least a little inoculum along the propagation path. So what’s best to do?

Cultural Controls for All Growers

- As always, do anything you can to improve airflow in the planting. This means good site selection with a site that slopes for air drainage if available, possibly increasing plant spacing slightly, and removing row covers promptly.
- Prevent weeds from getting established in the first place for many reasons, including the fact that apparently they can be hosts of *Colletotrichum* species too, and killing them with glyphosate or gramoxone makes the disease sporulate, as discussed in Part I. Remove the weeds from the field if they are large or cultivate lightly when weeds are small to control them. Consider smothering low-growing weeds with straw mulch so they decompose quickly.
- Try to avoid moving inoculum, which is easy to do. Work in infected areas and with susceptible cultivars last. Clean off equipment, hands, and clothes. If you aren’t washing your hands to stay healthy, here’s another reason – to avoid spreading anthracnose.
- Row covers aren’t a likely source of inoculum from season to season if stored relatively clean, but inoculum could be transported on them as they are dragged across an infected field – so try to watch how you move them.
- Anthracnose is primarily a rain-splashed disease, so try keeping straw tucked up close under plants. At a minimum, it will help keep the fruit clean.

- Especially if you are growing organically, consider trying low tunnels or high tunnels. Keeping plants dry equals no anthracnose.

Key Points Regarding Fungicide Use

- Think about which fungicides may be providing control, and which aren’t. If you suspect that resistance may exist in your plants to fungicides in category 11 (aka activity group 11, FRAC code 11, strobilurins, or QoI fungicides), avoid using category 11 fungicides because they may not be working, or if they are to a limited extent, they may not be for long. If using a pre-mixed product that combines a category 11 ingredient with one with another mode of action, avoid using the 11 + 7 combination, as the “7” part doesn’t work on anthracnose.
- Regardless of whether you suspect resistance or not, proceed with caution when using category 11 fungicides, or any other single-site fungicides – you can use them, and they may still work really well, but be sure to rotate active ingredients or include a multi-site fungicide like captan with them.
- Make captan an integral part of your spray program either alone, or as part of a tank-mix. It has multi-site activity.
- Rotate fungicide mode of actions as much as you can. This is a “big ask” for some growers because if the fungicide is expensive and the package contains more product than that needed for just strawberries, it’s difficult to spend the money. But it’s important. Consider using effective products that are also labeled for non-*Colletotrichum*-caused diseases on other crops.
- If using single-site fungicides, use the low to mid-range rate on the label. There are several studies that indicate that using the highest rate for single-site fungicides actually increases resistance development to them.
- See the table below for fungicides grouped into categories by mode of action, and whether they have single-site or multi-site modes of action. Only fungicides receiving “good” or “excellent” ratings for anthracnose control are listed in the table below. With a couple of the newer materials as noted in the table, some of these recommendations are based on lab results, not field tests, so use with caution.

Fungicides for a Spray Program to Control Anthracnose Fruit Rot

- Be sure to follow all label restrictions—the label is the law. The label supersedes the information presented here.
- Include the following product(s) in rotations or as a tank-mix partner.
 - ◊ **Active Ingredient** — Captan
 - ◊ **Example trade names and rates** — Captan 80 WDG**, 3.75 lb/a
 - ◊ **Activity (FRAC) Group** — M4
 - ◊ **Mode of action of a.i.(s)** — Multi-site
 - ◊ **Resistance risk*** — Low
 - ◊ **Re-entry interval (hrs)** — 24 hours
 - ◊ **Pre-harvest Interval (days)** — 0 days

**Note that anthracnose fruit rot only appears on certain labels; PA allows the use of products for diseases other than those listed on the label as long as the use pattern remains the same.

Continued on next page

BERRY PRODUCTION

If you suspect resistance to group 11 products on your farm, use captan as a “backbone” product for your spray program and rotate with or include the following products, being sure to include products from different activity groups.

Active Ingredient	Example trade names and rates	Activity (FRAC) Group	Mode of action of a.i.(s)	Resistance risk*	Re-entry interval (hrs)	Pre-harvest Interval (days)
cyprodinil + fludioxinil	Switch 62.5 WDG; 11 to 14 fl oz/a	9 + 12	Each is single-site	Medium	12 hours	0 days
pydiflumetofen + fludioxinil	Miravis Prime; 11.4 to 13.4 fl oz/a	7 + 12	Each is single-site	Medium to High	12 hours	0 days
polyoxin D zinc salt	Ph-D; 6.2 oz/a	19	Single-site	Medium	4 hours	0 days
propiconazole**	Tilt; 4 fl oz/a**	3	Single-site	Medium	12 hours	0 days
difenoconazole + cyprodinil**	Inspire Super; 16 to 20 fl oz/a**	3 + 9	Each is single-site	Medium	12 hours	0 days

**This material is included based on lab results; Field data is insufficient to determine a rating based on fieldwork.

If category 11 fungicides have worked well to control anthracnose in your production system, the following products may be used in addition to those listed above. Rotate chemistries and be sure to include multi-site fungicide (captan) with products that have one single-site mode of action.

Active Ingredient	Example trade names and rates	Activity (FRAC) Group	Mode of action of a.i.(s)	Resistance risk*	Re-entry interval (hrs)	Pre-harvest Interval (days)
azoxystrobin	Abound; 6.0 to 15.5 fl oz/a (include captan)	11	Single-site	High	4 hours	0 days
pyraclostrobin	Cabrio EG; 12 to 14 oz/a (include captan)	11	Single-site	High	12 hours	0 days
trifloxystrobin	Flint Extra; 2.5 to 3.0 fl oz/a (include captan)	11	Single-site	High	12 hours	0 days
fluxapyroxad + pyraclostrobin	Merivon Xemium; 5.5 to 8 fl oz/a	7 + 11	Each is single-site	High	12 hours	0 days
fluopyram + trifloxystrobin	Luna Sensation; 4.0 to 7.6 fl oz/a	7 + 11	Each is single-site	High	12 hours	0 days
azoxystrobin + difenoconazole	Quadris Top; 12 to 14 fl oz/a	11 + 3	Each is single-site	High	12 hours	0 days
azoxystrobin + propiconazole	Quilt Xcel; 14 fl oz/a	11 + 3	Each is single-site	High	12 hours	0 days

* Derived from fungicide resistance risk determined by the Fungicide Resistance Action Committee. Where more than one active ingredient is contained in a product, the rating for the more at-risk ingredient appears.

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Ms. Demchak and Dr. Elkner are with Penn State Extension. From Penn State Extension, <https://extension.psu.edu/strawberry-anthracnose-better-understanding-and-management>, May 28, 2020.

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BERRY PRODUCTION

Current Issues in Berry Crops

Kathleen Demchak

The strawberry crop is generally looking good, even if somewhat reduced to varying by spring frosts. Some growers are observing reduced berry size. The loss of king blossoms during cold events in May means that the current harvest is consisting of primarily secondary and tertiary fruit that are typically smaller in size. Some growers are reporting a heavy crop load, which can likewise reduce fruit size. Make sure that plants have sufficient moisture to size the fruit they have.

Some cases of damage to strawberry plants from **cyclamen mites** was reported, which consists of crinkled, off-color, distorted leaves emerging from the crown. These mites are very tiny and are deep within the crown, and you will not be able to see them without a microscope.

Thrips and **tarnished plant bugs** are present in strawberry plantings as well. Thrips can cause damage to the fruit surface and bronzing which is more easily seen on unripe fruit, while tarnished plant bugs will cause button-berries. Reports of strawberry plant wilting continue, attributed to either **Phytophthora crown rot** as discussed in the previous report with 'Flavorfest', or to **black root rot** in other cultivars. **Fruit anthracnose** is present, but crop loss appears to be less than it had been in the past 2 years.

The **blueberry crop load is quite heavy** overall, sometimes to the point where it may be difficult for the plant to ripen the entire crop. If this is the case, it may be helpful to remove some portion of the berries, especially if the plant appears to have few leaves relative to the amount of fruit.

Blueberry scorch, a virus that has not been commonly found in PA, is showing up this year. This disease is tricky to diagnose, as not all cultivars show symptoms, and severity of symptoms in an infected planting vary from year-to-year. Symptoms could be mistaken for botrytis blight or mummy berry, but a discerning factor is that the symptoms are much more severe on 'Berkeley' than other



Cyclamen mite damage to emerging leaves on strawberry. Photo credit: K. Demchak.

"Button-berry" resulting from tarnished plant bug feeding. Photo credit: K. Demchak.



Symptoms typical of blueberry scorch. Photo credit: K. Demchak.

cultivars. If you have 'Berkeley', and many of the new leaves and flower clusters are brown and crisp, please let extension personnel know, as we are trying to determine whether there are any additional plantings in the state that may have scorch. In cases where it has been found, plantings are quite old, and it is suspected that the original plant material may have been the source. In most cases, the infected plants are also failing to send up new canes.

Ms. Demchak is with Penn State Univ.
From Penn State Extension, June 16, 2020

Planting and Plant Stunting *continued from page 30*

transplants in the field. It is critical to have warm soil conditions after transplanting to allow roots to grow out into the bed quickly. In cold, cloudy conditions, plants shut down physiologically, little root growth occurs, and the existing roots on the transplant do not function well. If there is any wind, plants lose more water than they can take up and they die due to desiccation. This is accelerated when the sun does come out – the first sunny day after an extended cold, cloudy period will often result in extensive losses of weakened transplants. Extra caution should be taken to minimize root injury during transplanting, particularly with seedless watermelons. When transplanting, make sure that there is good root to soil contact and there are few air pockets around roots. Plant stunting can also occur with improper application of chemicals or fertilizers in the transplant water (phytotoxicity, salt damage)

Post Planting

We have already seen severe damage to transplants this year with seed corn maggots and root maggots post planting. Currently cucumber beetle feeding is a major problem that can lead to poor plant performance. Cloudy weather after planting is also limiting transplant growth this year.

Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 28, Issue 11, May 29, 2020.

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