

# NEWS

for the commercial vegetable, potato and berry grower

July 2019 / Volume 42 Number 7

PA Produce Month is for everyone! It's a time for consumers to support their local food and agricultural community, especially vegetable growers, by sourcing, preparing, and enjoying as much local produce as possible;

for the media to run fresh and unique stories about the many hardworking individuals who keep PA's vegetable industry alive and well; for farmers to celebrate their achievements, host specials, events, and more.

Established by the Pennsylvania Vegetable Marketing & Research Program (PVMRP), PA Produce Month is a good ol' celebration of one of Pennsylvania's shining stars - vegetables! It encourages all Pennsylvanians - consumers, farmers, and the media - to express gratitude, excitement, and pride for 31 days out of the year when many local vegetables are in their prime, August!

PA Produce Month, as the name implies, occurs anywhere within Pennsylvania's borders. While the PVMRP coordinates special happenings each year to celebrate and support the special occasion, we hope that people and organizations in various communities across the state find a way to celebrate that's all their own. Growers who retail their produce in particular as asked to

The celebration kicks off August 1 and concludes on the final day of the month, August 31, but the Program encourages

*August is*

**PA PRODUCE  
MONTH**



consumers to buy local produce throughout the year. There are tips, recipes, guides, and resources on [paveggies.org](http://paveggies.org) to help consumers enjoy PA veggies. The PVMRP starts preparing and releasing infor-

mation as early as June and offers consumers and growers email reminders, updates, and the latest news.

Pennsylvania's vegetable industry and community is an impressive force and deserves to be honored! In PA, August is an extremely bountiful time of year when many local vegetables are at peak freshness. The zucchini fields are overflowing and the tomatoes are perfectly tender and bursting with flavor, just to name a few. If you're proud of your great state and all the delicious vegetables it has to offer, then you're in favor of PA Produce Month celebrations!

As a grower, order a PA Produce Month point-of-purchase kit from the Program at [www.paveggies.org/farmers/point-of-purchase-materials/](http://www.paveggies.org/farmers/point-of-purchase-materials/) or purchase one at many of the produce auctions across the state. Other resources for celebrating PA Produce Month are available at <http://www.paveggies.org/farmers/farmers-toolkit/>. The Program will also be providing PA Produce Month materials to supermarkets across the state. Growers can call the Program at 717-694-3596 for further information.

## 23rd "Are You Crazy?!" Retail Farm Market Bus Tour Hits the Road in September

Join Penn State Extension for a special 23rd "Are You Crazy?!" Retail Farm Market Bus Tour as we visit markets in Virginia on September 24 and 25, 2019. This tour is for retail farm market professionals and is held at the height of the season to enable participants to learn from their regional farm market peers during their best and most robust season.

This event will include behind the scenes tours and information directly from farm market owners including unique display and merchandising ideas and information on market expansion and farm transition. The September tour will visit seven unique farms in two days highlighting agritainment, farm market development, diversification of products, customer relations and much more. Our rolling classroom environment

enables market owners and managers to share lessons learned, season highlights and discuss pertinent topics as we travel between tour locations.

Virginia Farm Market, Winchester, VA

[www.virginiafarmmarket.com](http://www.virginiafarmmarket.com)

The Virginia Farm Market is known for seasonal fruit, local produce and quality baked goods. This fourth generation business offers up the sweetest summer peaches, tasty vine-ripened tomatoes, local sweet corn and of course apples. The "Big Red Barn" is a casual open-air market with a childrens' playground and a picnic pavilion.

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## NEWS



**Pennsylvania  
Vegetable Growers  
Association**

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

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*Atglen*

**Mark Troyer '21**

*Waterford*

**Executive Director**

*William Troxell*

*Richfield*

**"Are You Crazy?!"... (continued from page 1)**

Marker-Miller Orchards, Winchester, VA

[www.markermillerorchards.com](http://www.markermillerorchards.com)

The Marker-Miller Farm Market features a large variety of fruits and vegetables along with pies, cakes, cookies and other baked goods. They even have gluten-free cookies and apple cider donuts. You can enjoy some hand dipped ice cream and take a break outside among the beautiful mountain scenery. Pick your own fruits and vegetables are available also.



Showalter's Orchard and Greenhouse, Timberville, VA

[www.showaltersorchard.com](http://www.showaltersorchard.com)

Showalter's Orchard and Greenhouse is family owned and operated since 1965. It's surrounded by breath-taking views of the Shenandoah Valley. It features more than 26 varieties of apples and the best apple cider you will ever taste. Showalter's offers a unique wedding destination and holds fun events throughout the growing season.

Back Home on the Farm, Harrisonburg, VA

[www.backhome-onthefarm.com](http://www.backhome-onthefarm.com)

There is something for everyone at Back Home on the Farm. Buy flowers from the greenhouse in the spring, enjoy butterflies, slingshots, summer camps and so much more in the summer and don't miss the corn maze and pumpkin patch in the fall. There is even a Toy Tractor Museum. And don't forget to check out Back Home of the Farm products such as jellies, pickles and salsas.

Yoder's Country Market, Madison, VA

[www.yoderscountrymarket.net](http://www.yoderscountrymarket.net)

As you walk through the front doors, a warm country feel envelopes you and you realize that you are not in 'just any store'. The hickory rockers in the entryway invite you to relax and enjoy your stay. The aroma of simmering soup or fresh pork barbecue wafts to you from the kitchen. This is Yoder's Country Market and they want you to feel at home so that you come on in and look around!



Messick's Farm Market, Bealeton, VA

[www.messicksfarmmarket.com](http://www.messicksfarmmarket.com)

Messicks Farm Market combines the best of what their farm harvests and what the community partners produce. The Farm offers the freshest, just-picked fruits and vegetables- including those you pick yourself! Messicks offers only the best local meat, dairy, spice, honey, jam and coffee products from trusted partners. The farm features a petting zoo, a jump pillow, events such as cruises and festivals and much more.

West Oaks Farm Market Winchester, VA

[www.westoaksfarm-market.com](http://www.westoaksfarm-market.com)

Experience 10th Generation Farming at West Oaks Farm Market. The market includes apples, peaches, cherries, plums, nectarines and fields of vegetables including sweet corn, tomatoes, peppers, cucumbers and a whole lot more. Don't forget to stop by the Market Deli and Café for lunch or ask about their CSA. In the fall visit the pumpkin patch or corn maze for some outside fun!

Bus departs from Penn State Extension Cumberland County promptly at 8:00 AM and will return by 7:30 PM.

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*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](mailto:pvga@pvga.org) website - [www.pvga.org](http://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 addresses.*

## James Stahl Named to 2019 Fruit and Vegetable 40 Under 40 Class

James Stahl of Harvest Lane Farms in Lititz has been named to the Fruit + Vegetable 40 Under 40 Class of 2019. PVGA nominated Stahl for the 2019 award.

The Fruit + Vegetable 40 Under 40 Awards honor 40 outstanding individuals making their marks in the industry. These 40 young professionals represent the best in the industry. The Fruit + Vegetable 40 Under 40 Class of 2019 will be honored at the Great Lakes Fruit, Vegetable & Farm Market EXPO, and recognized in the October 2019 issues of Fruit Growers News and Vegetable Growers News. PVGA will also recognize Stahl at the 2020 Mid-Atlantic Fruit and Vegetable Convention in Hershey.



Stahl owns Harvest Lane Farm in partnership with his father, Joseph Stahl. He oversees the production of a variety of different fruits and vegetables on 35 acres. The produce is primarily marketed through their farm market in Lititz, Pennsylvania. Stahl utilizes drip irrigation, high tunnels, a green house and plasticulture. He also manages employees and a chicken layer operation, along with growing field crops on 250 acres. He serves on the Pennsylvania Vegetable Marketing and Research Board.

Last year four Pennsylvania vegetable growers – Justin Hausman, Steven Johnson, David King, and Adam Voll were members of the 40 Under 40 Class of 2018.

## National News Briefs

### DOL Proposes H-2A Changes

Furthering the agenda to help America's farmers, the U.S. Department of Labor's Employment and Training Administration (ETA) and Wage and Hour Division (WHD) today is posting online a Notice of Proposed Rulemaking (NPRM) to solicit public comment on proposed changes to improve the H-2A temporary agricultural labor certification program. These proposed changes would modernize the Department's H-2A regulations in a way that is responsive to stakeholder concerns and enhances employer access to a legal source of agricultural labor, while maintaining the program's protections for the U.S. workforce and enhancing enforcement against fraud and abuse.

The NPRM includes several major proposals that would streamline and simplify the H-2A application process, strengthen protections for U.S. and foreign workers, and ease unnecessary burdens on employers. For example, the NPRM would streamline the H-2A application process by mandating electronic filing of job orders and applications, promoting the use of digital signatures, and providing employers with the option of staggering the entry of H-2A workers on a single application.

The NPRM also proposes to strengthen protections for U.S. and foreign workers by enhancing standards applicable to rental housing and public accommodations, strengthening surety bond requirements, expanding the Department's authority to use enforcement tools like program debarment for substantial violations of program rules, and updating the methodologies used to determine the Adverse Effect Wage Rates and prevailing wages to ensure U.S. workers similarly employed are not adversely impacted.

The Department is posting a copy of the NPRM in advance of its publication in the *Federal Register*. A copy of the NPRM can be found at <https://www.foreignlaborcert.doleta.gov/pdf/2019-07-15-ETA-1205-AB89-Temporary-Agricultural-Employment-of-H-2A-Nonimmigrants.pdf>.

### President Signs Disaster Aid Bill

A disaster-relief package that aims to help farmers and rural communities recover from catastrophic weather events in 2018 and 2019 is now law.

President Donald Trump recently signed the legislation following its passage by Congress. The \$19.1 billion package provides an extra \$3 billion in farm disaster assistance for USDA to help farmers offset crop losses. Other highlights include \$150 million in grants to develop essential community facilities in rural areas, \$558 million in conservation funding to help farmers rehabilitate farmland after natural disasters and \$435 million for emergency watershed work.

American Farm Bureau Federation President Zippy Duvall called the measure "an important lifeline for farmers and ranchers whose greatest desire is to keep producing the food, fuel and fiber that make our way of life possible."

Pennsylvania farmers could potentially see some benefits from the package, as 2018's heavy rain and flooding was declared a disaster throughout most of the state. However, it will be up to USDA to determine how funding is distributed if the bill is adopted.

See a detailed analysis of the package at <https://www.fb.org/market-intel/what-to-expect-in-the-new-disaster-aid-package>.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, July 2019.*

### Farmers Urge USMCA Approval

Farm organizations are urging Congress to ratify the U.S.-Mexico-Canada Agreement.

The proposed trade pact would replace the North American Free Trade Agreement, better known as NAFTA. Member nations reached agreement on USMCA last year, but the deal must now be ratified by Congress as well as Canada's and Mexico's legislatures.

The call came as several potential hurdles for approving the trade deal were removed. President Donald Trump in June called off an earlier threat to impose an escalating tariff on all imports from Mexico, saying he and Mexican officials have reached an agreement on curbing illegal immigration over the southern border. That removed what members of Congress warned could have been a major stumbling block in winning support for USMCA in Congress. The administration also lifted

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## NEWS

## State News Briefs

### New State Budget is Good for Agriculture

In the FY 2019-20 State Budget, there are many outcomes about which the Agriculture Community can be pleased. The law is Act 1A of 2019 (House Bill 790). Some highlights are:

- PA Department of Agriculture General Government Operations was increased from \$32.299 million to \$33.731 million.
- Items deleted in the original State Budget proposal were restored: Hardwoods marketing, Livestock and Consumer Health Protection, Livestock Show, Open Dairy Show, etc.
- There was a nominal increase in Penn State College of Agricultural Sciences Research and Extension from \$53.882 million to \$54.960 million. The University of Pennsylvania School of Veterinary Medicine received a slight increase from \$31.039 to \$31.660 million.
- Remaining constant were funding for the Fairs, the University of Pennsylvania Center for Infectious Diseases, Food Market Coupons, Center for Rural PA, etc.

There were some disappointments although certainly nothing serious considering the overall success of Agriculture in the State Budget, but there were things worth noting. First, the rapid-response contingency fund to meet food threats such as Avian Influenza received \$4 million instead of the requested \$5 million. PA Agriculture Surplus System (PASS) received \$1.5 million. PA State Council of Farm Organizations adopted a policy in May stating that the amount should be \$3 million for PASS.

Given the fact that agricultural program funding has been in a desert in recent years, these outcomes are not something causing great stress.

In addition to the spending bill (HB 790), there are other

accompanying bills, the Fiscal Code Bill (Senate Bill 712), the Tax Code Bill (House Bill 262), and the Administrative Code Bill (House Bill 1461). These bills specify from where the money will come and how it will be spent.

Some items of interest to the Agricultural Community:

- The Tax Code Bill increases Resource Enhancement and Protection Farm Conservation Tax Credit (REAP) by \$3 million. REAP also raised tax credits to \$250,000 in any seven-year period. Tax credits can go up to 80 percent for high priority best management practices as determined by the State Conservation Commission.
- The Fiscal Code Bill has a provision providing \$5 million to the Commonwealth Funding Authority for organic transition, processing and marketing grants. Senate Bill 623 (Schwank-R-Berks) sets the criteria for this funding to work. It is in the Senate Agriculture & Rural Affairs Committee.
- The Fiscal Code Bill includes a \$20 million payment for Growing Greener 2 Bond's debt service from the General Fund. The remainder of perhaps \$6 million would come from the Environment Stewardship Fund.

The environmental community opposed Governor Wolf's original proposal to take monies from the Environmental Stewardship Fund to fund normal government operations and environmental protection programs. Ultimately, their advocacy was unsuccessful with about \$10 million leaving the Environmental Stewardship Fund for the Department of Environmental Protection (DEP) and the Department of Conservation & Natural Resources (DCNR) in HB 790.

They were even unhappier with the Fiscal Code Bill (Senate Bill 712). SB 712 gives the Secretary of the Budget authority to transfer up to \$45 million from any other fund under

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### National News Briefs *(continued from page 3)*

tariffs that had been imposed on steel and aluminum imports from Canada and Mexico, clearing another potential roadblock for USMCA.

Pennsylvania Farm Bureau recently joined more than 900 food and agriculture companies and associations in urging congressional leaders in a letter to move quickly to ratify the agreement. The groups noted that U.S. food and agricultural exports to Canada and Mexico more than quadrupled under NAFTA.

"NAFTA has significantly helped create a reliable, high-quality supply of food products for U.S. consumers, while supporting more than 900,000 American jobs in food and agriculture and related sectors of the economy," the groups wrote. "USMCA builds on the success of the NAFTA agreement, and will ultimately lead to freer markets and fairer trade."

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, July 2019.*

### FDA Finalizes Guidance to Help Facilities Determine Their Business Size Under FSMA Preventive Controls Regulations

The U.S. Food and Drug Administration has finalized guidance to help facilities determine their business size under the Preventive Controls for Human Food (PC Human Food) and Preventive Controls for Animal Food (PC Animal Food) rules issued in response to the FDA Food Safety Modernization Act

(FSMA).

Under the PC Human Food and PC Animal Foods rules, a facility that is a "small business" may have a later compliance date and certain activities performed by a farm mixed-type facility that is a "small business" are exempt from the preventive controls requirements of the PC rules.

A "small business" is defined in the rules as a business (including any subsidiaries and affiliates) employing fewer than 500 full-time equivalent employees. The limit of 500 employees includes all employees of the business and is not limited to the employees at a particular facility. But what does "full-time equivalent employee" mean? And if you have a business with subsidiaries or affiliates how should you go about determining your number of employees?

The final guidance issued today is designed to answer these questions. The guidance explores key definitions such as "subsidiary," "affiliate" and "full-time equivalent employee." It also offers a method for calculating full-time equivalent employees, and examples of the types of situations facilities might experience when trying to decide which employees to count to determine whether they are a small business.

**For more information** visit <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-determining-number-employees-purposes-small-business-definition-parts-117-and-507>



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the Governor's authority to the operating budgets of DEP and DCNR. The Fiscal Code Bill also includes a permanent authorization to transfer monies from the Recycling Fund for operating costs of DEP and DCNR. Additionally, the Marcellus Legacy Fund will no longer transfer \$20 million a year to the Environmental Stewardship Fund and the Joint Legislative Air and Water Pollution Control and Conservation Committee will cease to exist July 1, 2021.

The Growing Greener Coalition said that the Environmental Stewardship Fund transfers could have planted 32,000 acres of stream buffers. Thanks to Dave Hess and the Environmental Digest for contributing information vital to this issue of AG ONE Newsletter.

*From the AG ONE Newsletter, Penna. State Council of Farm Organizations, Post-Budget Issue, Issue 2019.6, July 8, 2019*

**Proposed Sunday Hunting Expansion Limited to Three Days**

State senators recently passed an amended version of a bill to expand Sunday hunting in Pennsylvania that would limit the expansion to three Sundays.

Previous versions of the measure, Senate Bill 147, had called for giving the Pennsylvania Game Commission full authority to establish Sunday hunting rules. With the amendment, the expansion would include three Sundays: One during deer rifle season, one during statewide deer archery season and one at a time determined by the Game Commission.

The measure, which now heads to the state House for consideration, would also strengthen hunting-related trespass laws to make violations a primary offense with tougher penalties.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, July 2019.*

**Wolf Signs Multiple Ag Bills into Law**

Governor Tom Wolf signed a number of bills into law which affect the Agricultural Community:

- Act 28 (Senate Bill 338) increases allowable width for farm equipment to be 18 feet, up from the current 16 feet.

- Act 34 (House Bill 1514) provides for the Farm to School program. –

- Act 35 (House Bill 1516) creates a rapid response fund for threats to agriculture such as Avian Flu.

- Act 36 (House Bill 1520) sets forth criteria on how PA Preferred is to operate and also creates a program designed to help veterans to become farmers.

- Act 37 (House Bill 1526) re-establishes the low interest program known as Agriculture Linked Investment Program.

- Act 38 (House Bill 1590) creates the Dairy Investment Program.

- Act 39 (Senate Bill 634) establishes the Conservation Excellence Grant Program.

- Act 40 (Senate Bill 661) creates the Commonwealth Specialty Crop Program to supplement USDA's grants by including such commodities as hemp or hops. It also establishes a grant program for urban agriculture, and restores a youth grant program.

*From the AG ONE Newsletter, Penna. State Council of Farm Organizations, Post-Budget Issue, Issue 2019.6, July 8, 2019*

**Governor Signs Bill to Allow Wider Farm Equipment**

A push to allow farmers to move wider equipment on roadways is now law.

Gov. Tom Wolf signed Senate Bill 338 in June, following its passage by the General Assembly.

The measure, sponsored by Rep. Wayne Langerholc of Cambria County, allows farmers to operate equipment up to 18 feet wide on roadways within 50 miles of their farm under certain safety restrictions spelled out in the Vehicle Code. That's an increase from the previous width limit of 16 feet.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, July 2019.*

**Beginning Farmer Bill Signed**

A proposal that aims to help the next generation of Pennsylvania farmers get established has crossed the finish line.

Gov. Tom Wolf signed Senate Bill 478 in early July, following its passage by the General Assembly.

Pennsylvania Farm Bureau worked with state Sen. Elder Vogel of Beaver County to introduce the legislation, which establishes an income tax credit for landowners who lease or sell land, buildings and/or equipment to beginning farmers.

The bill allows for a one-time tax credit for property sold to a beginning farmer or a multi-year credit for property leased. The tax credit could be used to aid in family transitions—such as sales from a parent or grandparent to a child or grandchild—or to help an unrelated beginning farmer. The bill outlines criteria defining who is a beginning farmer, excluding individuals who have been engaged in farming for more than 10 years.

For every four farmers in Pennsylvania that are age 65 or older, there is only one farmer under the age of 35. PFB believes that helping young farmers pick up the reins and get established is critical to continuing Pennsylvania's agricultural legacy. And with no neighboring states offering such a program, PFB believes a tax incentive in Pennsylvania could make the state a regional leader in agriculture.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, July 2019.*

**Ag Security Law Updated**

A to update the state's Agricultural Area Security Law to clarify how landowners may want to handle the need for additional farm residences when preserving their farm has been signed into law.

Gov. Tom Wolf recently signed House Bill 370, following its passage by the General Assembly.

Previously, state law allowed for the creation of one additional farmstead residence on preserved farms. The bill, sponsored by Rep. Kate Klunk of York County, gives farmers the option to waive this right for an additional farmstead in order to reduce the value of their land.

Additionally, the change clarifies that preserved farm owners can subdivide their land for a second residence, whether it is standing or needs to be constructed. State law previously allowed for subdivision only when another farmhouse is going to be constructed, not for one that is standing.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, July 2019.*

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## NEWS

## MARKETING

**State News Briefs** (continued from page 6)**State House Committee Approves Bill to Limit Liability for Agritourism**

A bill that would protect agritourism operators from frivolous lawsuits has cleared its first hurdle in the state House.

The House Agriculture and Rural Affairs Committee voted 24-0 to send House Bill 1348, sponsored by Rep. Barb Gleim of Cumberland County, to the full chamber for consideration.

The measure would provide limited civil liability for farmers who operate agritourism operations, protecting them from lawsuits over injuries that occur as a result of common farm hazards. Agritourism operators would have to post multiple warning signs and provide written notification of risks to participants.

The measure would not bar cases from going to court in instances where the farmer has been found to have acted with a willful disregard for public safety. However, it would offer protection from lawsuits over mishaps due to common risks of being on a farm and not because of bad actions on the part of the landowner.

Similar laws are on the books in 26 other states.

From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, July 2019.

**Broadband Resolutions Adopted**

On July 26, the Senate adopted two Resolutions sponsored by Senator Kristin Phillips-Hill (R-York). They are Senate Resolution 47 which establishes a legislative task force committee on Broadband. Senate Resolution 48 directs the Legislative Budget & Finance Committee to review non-rural telecommunications companies to see if they are meeting their statutory requirements in providing Broadband to Pennsylvanians. Broadband access is a major priority of the PA State Council of Farm Organizations.

From the **AG ONE Newsletter**, Penna. State Council of Farm Organizations, Post-Budget Issue, Issue 2019.6, July 8, 2019

**New Penn State Extension Director Named**

Penn State has named Brent Hales as the new director of Penn State Cooperative Extension. Hales, who starts Sept. 3, will also serve as associate dean in the College of Agricultural Sciences.

"We are delighted to have Brent Hales assume the direction of Penn State Extension and join the college's leadership team," said Rick Roush, dean of the College of Agricultural Sciences. "Dr. Hales comes with an outstanding track record of innovation, and his academic and administrative expertise will be assets in guiding the ongoing implementation of new extension program-delivery and business models."

Hale currently serves as senior associate dean and chief financial officer for the University of Minnesota Extension, where he has served in various roles since 2012. Before coming to University of Minnesota, Hale directed University of Southern Mississippi's Center for Economic Entrepreneurship and Education, where he created an award-winning small business development program for high school students, was a faculty member at Delta State University, where he directed the Center for Economic and Community Development and the Center for Business and Entrepreneurial Research.

Hales received bachelor's and master's degrees in sociology from Brigham Young University and Middle Tennessee State University and a doctorate in rural sociology from Iowa State University.

From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, July 2019.

**Farmers Market Food Safety Online Course Available**

Selling food at farmers' markets is popular and profitable. This online course teaches vendors and producers about food safety and preventing foodborne illness.

With the continued popularity of eating healthy, access to fresh fruits, vegetables, and other freshly made products is more popular than ever. Farmers' markets are attracting more customers — and vendors. Ensuring food safety at farmers' markets is an important responsibility of the vendors.

Through a combination of videos and reading, this course focuses on teaching new and established farmers' market vendors the basics of food safety and sanitation.

Food safety begins at product harvest, and continues through processing, preparation, transportation, and point of sale. In this course, you will learn about controlling food safety risks from "farm to fork." The topics covered include: equipping food-safe facilities; sourcing and purchasing ingredients; product handling and preparation; sales and service at the farmers' market; and record keeping, traceability, and liability.

Printable handouts to help control risk from farm to fork are included including: biological contaminants, manual cleaning, types of cleaners, types of soil, solubility characteristics, and recommended cleaning procedures, hand-washing, good sanitary practices, and food cooking requirements. A useful Event Checklist is also provided to help you, as a vendor, prepare for and set up your farmer's market stand.

This course is designed for existing farmers' markets vendors and those interested in becoming a vendor

You will learn how to:

- evaluate potential risks related to food safety at farmers' markets from harvest through sale of the food product
- equip and operate food safe facilities
- source and purchase ingredients
- handle and prepare food properly
- identify on-site food safety procedures
- know what is needed for proper record keeping, and food or ingredient traceability
- recognize potential liability issues.

The cost for the course is \$39.00. For more information and to register, visit <https://extension.psu.edu/farmers-market-food-safety-online>.

## NEWS

**"Are You Crazy?!"**... (continued from page 2)

This year our tour bus leaves from the Penn State Extension office in Cumberland County. The tour fee if \$280 includes overnight hotel stay, bus fare, lunch on both days of the tour and breakfast on the second day. Dinner on the first day of the tour will be on your own.

Each year this tour brings unexpected learning opportunities and beneficial networking connections to its participants. We look forward to two full, well-rounded days of interactive education and networking with some great folks!

To register for the Are You Crazy Retail Farm Market bus tour call 1-877-345-0691 or go to <https://extension.psu.edu/are-you-crazy-retail-farm-market-bus-tour>. Registration deadline is August 23, 2019 for the advertised fee. Registrations after August 23 will be higher.

Market descriptions and photos taken from the market websites.

# Late Blight Confirmed on Potato in Erie County

Beth Gugino



White sporulation visible on the underside of a late blight lesion on potato leaves (Photo credit: Beth Gugino).

Late in the week of July 14, late blight was confirmed on one commercial farm in two potato fields planted with the cultivar Snowden in Erie Co., Pennsylvania. It is also suspected but unconfirmed in a potato field in Cambria Co. Samples from Erie Co. were promptly collected and the genotype determined to be US-23. US-23 has been the predominant genotype on both tomato and potato over the past five years across the region. It is characterized as being equally aggressive on both tomato

and potato, is the A2 mating type and sensitive to mefenoxam although, there have been some reports of intermediate sensitivity. This outbreak likely either originated from infected potato seed or spread from a near-by cull pile.

Tomato and potato are both susceptible at any growth stage. It is characterized by lesions that are irregular in shape and initially water-soaked and pale-green before turning more gray-brown in color. Under humid conditions, the lesions on the underside of the leaves will sporulate giving them a white fuzzy appearance. On tomato, the lesions will tend to develop on the upper to middle part of the plant as opposed to early blight and Septoria leaf spot that start on the lower leaves and progress up the plant. Foliar blight caused by *Phytophthora nicotianae* will cause lesions very similar to late blight however, the sporulation will not be visible on the underside of the leaf even if conditions are favorable or after being incubated in a plastic bag or other container.

There are a number of conventional fungicides that are very effective for managing late blight if managed preventatively. On tomato, chlorothalonil can even be effective if applied on a weekly schedule preventatively and good coverage is obtained. Keep in mind that late blight will not progress when temperatures reach above 90°F however, the high temperature will not kill the pathogen, so the disease will continue to progress when the temperature drops in the evening and the leaves are wet as a result of dew.

Late blight specific fungicides would include products such

*(continued on page 10)*

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## VEGETABLE PRODUCTION

## Cucurbit Downy Mildew in NJ

Beth Gugino

Around July 20 cucurbit downy mildew was confirmed on butternut squash in southern New Jersey. This is in addition to the previous report cucumber earlier this month. Weather conditions the past few days have placed the very southeast corner of PA at high risk for infection again. Growers in Chester, Montgomery, and Bucks Counties should be scouting cucumbers, muskmelons and now butternut squash, pumpkin and other winter squashes carefully and vigilantly. This part of the state has been at high risk multiple times this season and crops not protected by fungicides are at high risk for the development of downy mildew. At the very least, growers in southeastern PA should be using a protectant spray program. We are actively monitoring for this disease so please either contact me via email at [bkgugino@psu.edu](mailto:bkgugino@psu.edu), by phone



Both powdery mildew (circular white spots) and downy mildew (angular purplish spots) on the underside of a pumpkin/winter squash leaf (Photo credit: Beth Gugino).

at 814-865-7328 or contact your local Extension office for confirmation. All reports aid in our ability to successfully forecast disease risk. Check the CDM ipmPIPE website at [www.cdm\\_ipmpipe.org](http://www.cdm_ipmpipe.org) for the latest reports and forecasts that are updated three times per week.

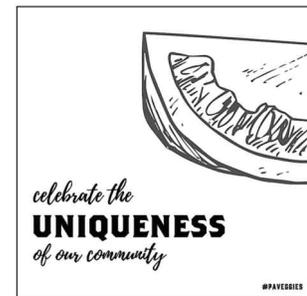
*Dr. Gugino is the Extension Vegetable Pathologist at Penn State Univ. From **Penna. Vegetable Disease Update**, Penn State Extension, July 24, 2019.*

### Late Blight... (continued from page 9)

as but not limited to, Previcur Flex (FRAC 28), Ranman (21), Zampro (45+40) or Orondis Opti (U15+M5). See the [2019 Mid-Atlantic Commercial Vegetable Production Recommendations](#) and [2019 Fungicide Resistance Management Guidelines for Vegetable Crops](#) for additional recommendations on both tomato and potato. These products should be tank mixed with a protectant for fungicide resistance management and alternated/rotated between different FRAC codes. For organic growers, copper-based programs tend to be most effective. Another possible option would be to alternate between Regalia and Actinovate both tank mixed with a copper-based fungicide. These products are most effective when applied preventatively and regularly when conditions favor disease. Good spray coverage is essential.

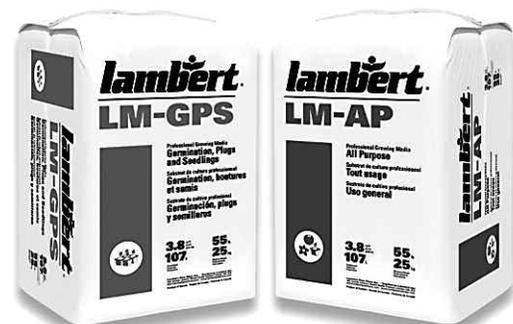
If you suspect late blight on your farm, please contact your local Penn State Extension Office or let Beth Gugino know via email at [bkgugino@psu.edu](mailto:bkgugino@psu.edu) or by phone at 814-865-7328. We are interested in collecting samples so we can better understand how the pathogen population is changing both within and across growing seasons. Also for the information regarding where the latest confirmed outbreaks have been reported and to receive email or text alerts about when late blight has been confirmed with a personally defined radius from your location visit <http://usablight.org>.

*Dr. Gugino is the Extension Vegetable Pathologist at Penn State Univ. From **Penna. Vegetable Disease Update**, Penn State Extension, July 24, 2019.*



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# Other Current Vegetable Issues

*Penn State Extension Specialists and Educators*

## Insect Pest Update

The second generation of striped cucumber beetles are active in cucurbit fields across the state and adult western corn rootworm is now also appearing. They can be distinguished by their abdomen which is yellow if it is a corn rootworm and black if it is a striped cucumber beetle. Despite low sweet corn trap counts across many parts of the state, some spots are high and many sites in Delaware are very high, and some growers are still experiencing worm issues in the ears in locations with low trap counts. In some cases, this is likely due to the development of pyrethroid resistance from immigrating populations in southern locations, plus in fields where growers have relied on pyrethroids without rotating to other modes of action for resistance management. Be scouting for Japanese beetle. Also squash bugs are starting to hatch out of the characteristic bronze eggs laid in a diamond pattern on the underside of the leaf. The youngest nymph stages are most sensitive for insecticide applications. In general, the hot and dry weather also favors thrips and mites on many different crops and there have been higher populations of potato leafhoppers are being observed.

## Disease Update

Cucurbit powdery mildew is being more common especially with the drier conditions. Remember that protectant fungicides will only the surface to which they are applied so when scouting be sure to check the undersides of the leaves and

stems. It is recommended that fungicide programs be initiated when one lesion is present on 50 scouted leaves. No reports of late blight to date. Although *P. nicotianae* was confirmed on tomato. It can cause buckeye rot on the fruit and a foliar blight with symptom very similar to late blight on the leaves but there will be no sporulation. Be scouting for Alternaria leaf spot on broccoli, cauliflower and other cole crops. This disease was very problematic last year due to the wet conditions. Alternaria can also cause early blight on tomato and potato however, it is a different species than the one affecting cole crops. Just today, cucurbit downy mildew was confirmed in a commercial cucumber field in eastern Massachusetts to add to the other nearby reports in New Jersey, Maryland and Virginia. This past week it was confirmed on butternut squash in central North Carolina.

*From Penn State Extension.*



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VEGETABLE PRODUCTION

# Potassium and Other Factors Needed for High Quality Tomatoes

Gerald Brust

Tissue tests taken in tomato fields over the last 6 weeks show that fields with good levels of potassium (K) (>3.2%) have overall lower levels of fruit ripening problems than fields with below recommended levels of K (< 2.5%). Figure 1 shows an example of a tomato with good levels of K, while Figures 2 and 3 show what often happens when K levels are too low. Tomatoes like the one in Figure 2 can still occur in fields with high K levels because about 60% of the fruit ripening problems can be explained by the lower levels of potassium in the plants, but that still leaves about 40% that potassium levels do not explain. What are some of these other factors? One of them is the cultivar grown, some cultivars are just more prone to fruit ripening problems than others and the best way to find the ones that work in your growing system is to trial several cultivars over the years.

Another factor is the weather. Intense heat and high humidity along with very intense sunny days or heavy downpours will take a toll on plants and can reduce the quality of the fruit. The first few clusters of fruit that are produced on a vine usually look the best as these clusters are found deep inside the plant and shielded from rain and intense sun. As the later clusters mature they are often exposed (Fig. 4) and can end up with sunscald, rain check (Fig. 5) or other fruit ripening problems. Good canopy coverage will help with protecting these later clusters of fruit. One other thing that will help with these exposed fruit is using a 30% shade over the top 1/3-1/2 of the plants. I know most growers will not use this but it has been shown to increase the marketable yield of tomatoes by 20-50% depending upon the year and the shade cloth can be used for many years. Other factors impacting fruit quality include diseases and other nutrient deficiencies such as phosphorus, nitrogen and boron. So, while there are many factors that go into producing a lovely red tomato, potassium levels, cultivar selection and weather play the biggest roles and their impact can be mitigated to produce the best fruit with the best investment.



Figure 2. Greater level of internal whitening



G Brust, University of Maryland

Figure 3. Very high level of internal whitening



G Brust, University of Maryland

Figure 1. No internal whitening of tomato



G Brust, University of Maryland

Figure 4. Fruit clusters exposed to the weather

(continued on page 14)

# Stinkbug Damage Found in Many Tomato Fields

Gerald Brust

I have seen and have gotten reports of (and some really nice pictures of) stinkbug damage in tomatoes [in late June and early July] from all over Maryland including the Eastern Shore. Stinkbug feeding damage is called cloudy spot in tomato fruit (Fig. 1). It occurs when the adult or immature stinkbug puts its needle-like mouth parts into the fruit and removes material from a large number of cells. On green fruit the damage appears as whitish areas with a black dot in the center and

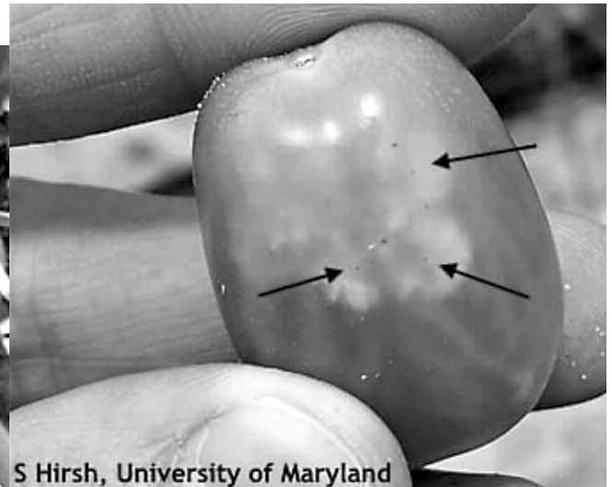


S Hirsh, University of Maryland

Figure 1. Stinkbug injury to grape tomatoes, white when tomato is green turning yellow as fruit ripens.

indistinct borders (Fig. 2) on ripe fruit the spots are golden yellow (Fig. 1). Individual spots may be 1/16 – 1/2 inch in diameter; or, the spots may merge and encompass a large area of the fruit surface (Fig. 2). Peeling back the skin shows these areas as white shiny, spongy masses of tissue (Fig. 3). This damage is usually most common from mid-July until the end of the season, but this year we started seeing it at the end of June. The Green and Brown as well as the Brown Marmorated stinkbug are often difficult to see and usually go unnoticed as they spend much of the day deep inside tomato plants, any disturbance and the stinkbugs will drop to the ground and move under the plastic, which results in monitoring difficulties. Only a few are necessary to cause the appearance of cloudy spot on many tomato fruit. Although stinkbug damage has been observed in greater than usual amounts in tomato fields this year, observations of stinkbugs have been much less numerous.

Stinkbugs are extremely difficult pests to control. As alluded to earlier, there are no good methods for monitoring these pests. Traps do not work well, visually scouting for them has proven to be unreliable and too time consuming. Usually stinkbug damage is only a nuisance, but so far this year it has resulted in moderate losses in some fields. Growers should examine the edges of their fields carefully for tomato fruit with cloudy spot. There are



S Hirsh, University of Maryland

Figure 2. In the center of each cloudy spot is a tiny black dot where stinkbug mouthparts penetrated into the tomato.



G Brust, University of Maryland

Figure 3. Stinkbug feeding causing cloudy spot on tomato fruit.

(continued on page 14)

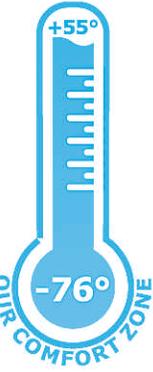


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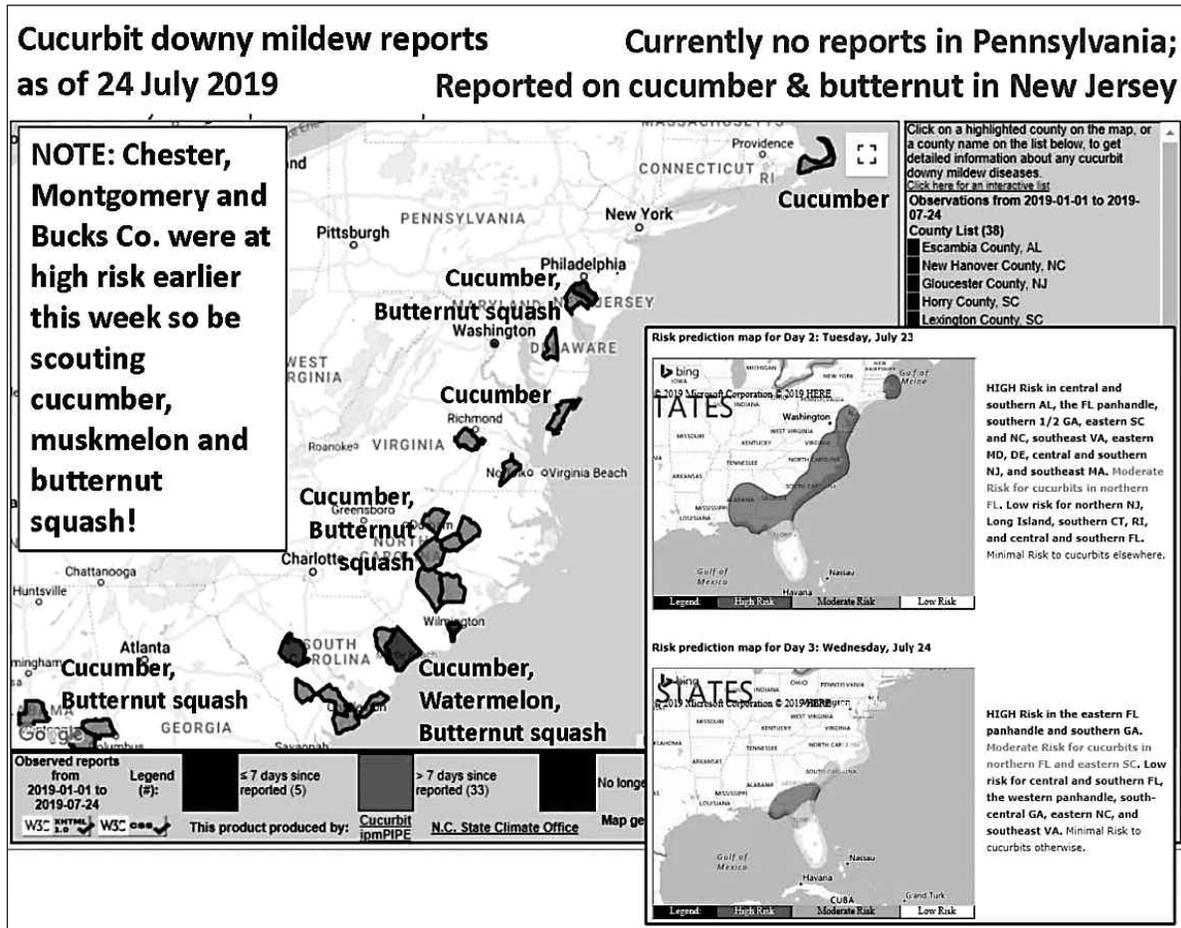
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VEGETABLE PRODUCTION

**Cucurbit Downy...** (continued from page 10)



**Potassium and Other...**  
(continued from page 12)

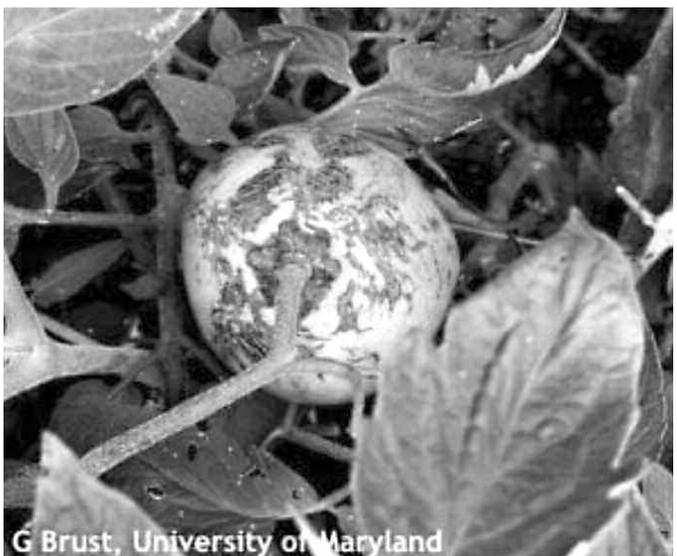


Figure 5. Rain check on tomato fruit

Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 27, Issue 18, July 24, 2019.

**Stinkbug Damage...** (continued from page 13)

some acceptable chemical choices for stink bug control. Pyrethroids (Warrior II, Hero EC, Tombstone and Mustang Maxx) or Venom or Scorpion can be used to reduce damage. Sprays should be directed towards the center of the plant with high pressure and a high gallonage (50-100 gal/a). If harvest has started there are neonics and pyrethroids that have very short PHIs – check your Mid-Atlantic Commercial Vegetable Production Recommendations guide. It should be understood that none of the chemicals will give complete control but will reduce damage compared with no chemical usage. Organic growers can try Entrust or Azera or Pyganic for control of nymphs, but not for adults, i.e., these materials will not control adults.

Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 27, Issue 15, July 5, 2019.



# Managing Phytophthora Blight

Susan B. Scheufele

This disease, caused by the soil-dwelling oomycete *Phytophthora capsici*, has a wide host range including all cucurbits, tomato, eggplant, pepper, beans, and some weeds (purslane, Eastern black nightshade, Carolina geranium). Warm, wet conditions with frequent rainstorms, like the recent weather, favor disease development. Symptoms vary by crop and may be easily confused with other diseases like bacterial wilt or issues such as water-logging. Be on the lookout for the symptoms described below and submit suspect plants or fruit to the diagnostic lab in order to get a proper ID. This will prevent you from moving the pathogen around your farm and from planting susceptible crops in infested fields in future years. There is also a lot you can do now to manage the disease on your farm.



*Phytophthora* lesion on pumpkin. Photo: M.T. McGrath

**Symptoms.** Many of you are probably all too familiar with the symptoms of *Phytophthora* blight on cucurbit fruit but you may not know that many other vegetable crops are also susceptible, though they may exhibit different symptoms. Symptoms of *P. capsici* on squash fruit are firm, round, water-soaked lesions that develop white mycelial growth that resembles powdered sugar under warm, moist conditions. Cucurbit plants, especially non-vining varieties, can also develop symptoms of crown rot

where whole plants or vines wilt suddenly and eventually the whole plant collapses. Symptoms on pepper are distinctly different, as plants become infected with *P. capsici* via their roots and develop a crown rot that causes darkening of roots and stems and permanent wilt of foliage, while stems remain rigid. Pepper fruit remains attached to the upright stems but may eventually develop dark, water-soaked lesions that can spread to the whole fruit, giving it a soft, wrinkled appearance. On tomato, *P. capsici* causes 'buckeye rot' on fruit where it comes in contact with the ground. Small brown spots on fruit grow into large, round or oblong lesions with alternating rings of light- and dark-brown discoloration. The lesions are firm, with smooth margins but eventually become soft. In recent years, *Phytophthora* blight has been confirmed on lima and snap beans in the field and on soybean under lab conditions. These crops had previously been considered non-hosts. Bean pods



*Phytophthora* blight has wiped out the entire front section of these squash beds. Photo: UMass Vegetable Program

(continued on page 16)

## Be Prepared When The Weeds Start To Grow



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## VEGETABLE PRODUCTION

**Managing Phytophthora...** (continued from page 15)

develop water-soaked lesions that develop diffuse, white sporulation. Bean stems and crowns can also be affected; plant collapse in low-lying areas of fields is common.

**Disease Cycle.** *P. capsici* persists in soil for many years as thickwalled resting spores called oospores. These long-lived oospores can be spread throughout the field during tillage or cultivation, and they can be spread between fields or farms on infested soil clinging to tractor or truck tires, harvest buckets, workers' boots, or even discarded infected fruits. Oospores germinate and produce asexual, short-lived sporangia that contain 20-40 zoospores. Zoospores are motile spores that swim towards host roots or fruit and infect. The resulting lesion will then produce more sporangia and zoospores that can be spread by surface water, rain, or splashing water. One infected spaghetti squash is estimated to produce 44 million sporangia with the potential to release 840 million zoospores (Hausbeck and Lamour, 2004). This accounts for the rapid, above-ground spread of disease within a field or a season. Outbreaks often start in low-lying or poorly drained areas of fields, where oospores are triggered to germinate and swimming zoospores are able to find hosts. Growers often assume that stunting or death of plants in these areas of the field is caused by waterlogging, but infection with *P. capsici* may be the real cause. Importantly, water run-off from an infested field may contaminate surface water sources used for irrigation. This has been well-documented in irrigation ponds and rivers in New York and Michigan (Hausbeck and Lamour, 2004).

If you do have *P. capsici* present on your farm, there are cultural practices that can be effective in helping to manage the disease:

- **Crop rotation:** A minimum crop rotation of 3-4 years is recommended, although fields that have been out of susceptible crops for >5 years have had outbreaks in recent years. Planting non-hosts into infested fields for any number of years is useful—each year an infested field is planted with a non-host, the number of surviving oospores will be reduced. The host range of *P. capsici* is broad but the list of non-hosts includes brassicas, carrots, onions, and small grains. Tolerant pepper varieties are available if crop rotation is impossible. Similarly, pumpkin varieties with hard shells, such as 'Lil Ironsides' or 'Apprentice' have been shown to be significantly less susceptible to disease than similar varieties with conventional, soft rinds.
- **Cover crops** can be used to help mitigate the effects of *P. capsici*, as the addition of soil organic matter stimulates beneficial microbes. A healthy soil microbial community can reduce plant pathogen activity by outcompeting them for space and nutrients, by direct parasitism of plant pathogens, by producing antibiotic compounds that slow pathogen growth, and by stimulating the plants' natural defense systems.

**Biofumigation:** Research has shown that brassica cover crops (especially mustards) release glucosinolates and other compounds as they break down that are toxic to microorganisms, including plant pathogens. Plant pathogens are not always great soil competitors, so this "biofumigation" allows beneficial microorganisms to repopulate the soil. In order to get the highest release of glucosinolates, the brassica cover crop should be fertilized. At termination, incorporate the brassica residues by chopping and rototilling, followed by cultipacking and irrigating just before the crop is planted. Allelopathy can be a concern for some sensitive crops when using this system. For

more detailed info check out this factsheet from Cornell University at <http://www.hort.cornell.edu/expo/proceedings/2016/Vine%20Crops%20DEMYSTIFYING%20BIOFUMIGATION%20WITH%20BRASSICA%20COVER%20CROPS%2000Dea.pdf>.

**In-season management steps.** Plan on harvesting from clean fields before you go into infested fields with tractors, trucks, workers, and bins. Take time to wash equipment when moving between fields to remove soil or crop residues that may contain sporangia or oospores. Ideally, do not leave infected fruit in fields or in cull piles. If the infested area is large and plant material cannot be removed from the field, make sure to till it under deeply. Remember that there is a 2-6 day lag period between infection and symptom expression so if you suspect *P. capsici* is present, hold fruit for a few days before sending large wholesale shipments out to avoid their being returned due to rot.

**Chemical control.** Fungicides can be used effectively and economically to reduce the impact of disease on yield, though none will provide sufficient protection to be used as the sole management strategy—they must be part of an integrated program including cultural controls. For many row crops, applying fungicides through trickle irrigation (if allowed by product label) can help control crown rot, but in vining crops, foliar applications will be needed later to protect developing fruit, which may be resting on infested soil. Foliar applications can be difficult to make because of dense canopy. Air-assisted nozzles may help improve coverage. *P. capsici* has the ability to develop resistance to targeted fungicides, so resistance management strategies like mixing targeted fungicides with protectant fungicides and rotating modes of action with every application, are extremely important. Some populations of *P. capsici* have become resistant to Ridomil (mefenoxam), which was often used to drench plants in the early season. Thus, Ridomil may no longer be effective in fields where it has been used repeatedly. Instead, you can treat transplants or seedlings with a drench treatment of a phosphorous acid fungicide such as ProPhyt, K-phite or Fosphite, which have been shown to be effective as soil or foliar applications. Other effective, targeted materials include:

- **Orondis:** Oxathiapiprolin is a new active ingredient which has demonstrated excellent efficacy against oomycete pathogens including *P. capsici*. Two formulations are labeled for Phytophthora blight: Orondis Gold 200 and Orondis Ultra. Orondis Opti is not labeled for Phytophthora blight.
- **Orondis Gold 200** (oxathiapiprolin): FRAC 49, PHI 0d, REI 4 hrs. At-planting soil applications only for Phytophthora blight. Foliar applications of other FRAC-49 containing products is prohibited after soil applications.
- **Orondis Ultra** (oxathiapiprolin + mandipropamid): FRAC 49+40, PHI 0d, REI 4 hrs. Also labeled for cucurbit downy mildew. Make no more than 2 consecutive applications. See label for further restrictions.
- **Ranman** FRAC 21, PHI 0d and REI 12hrs. Can be used beginning before symptoms occur for a maximum of 6 applications.
- **Omega** FRAC 29, PHI 7 days (squash, cucumber), 30 days (melon, pepper) REI 12 hrs. Apply no more than 7.5 pts/A to a crop or 4 applications if applied at highest label rate of 1.5 pts/A. Omega is more expensive than other fungicides.

(continued on page 17)

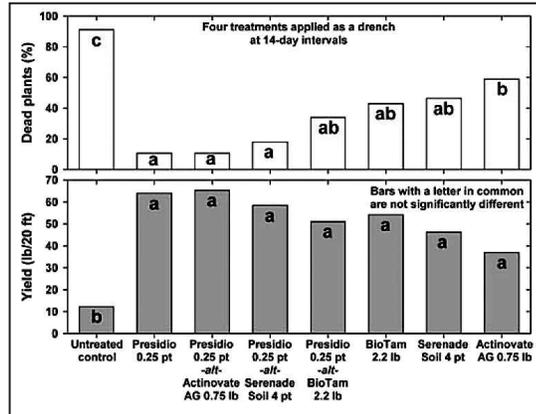
VEGETABLE PRODUCTION

**Managing Phytophthora...** (continued from page 16)

- **Forum** FRAC 40, PHI 0d, REI 12 hrs. Can be used on all cucurbit crops at 6 oz/A every 5 to 10 days, depending on disease pressure, beginning when plants are 4-6 inches high for a maximum of 30 oz or 5 applications. It must be used in a tank mix with an effective fungicide that has a different mode of action (non-Group 40 fungicide).
- **Tanos** FRAC 11+27, PHI 3d, REI 12hrs. Labeled at 8-10 oz/A for a maximum of 4 applications. Tanos must be tank-mixed with a protectant fungicide like copper, chlorothalonil or mancozeb. Follow a strict alternation with no consecutive applications of Tanos.
- **Gavel** FRAC 22+M3, PHI 5d, REI 48 hrs. Labeled for use at 1.5–2.0 lb/A every 7 to 10 days or when conditions are favorable for disease for a maximum of 8 applications.

Presidio and Revus are other materials that would make good choices for managing Phytophthora blight in cucurbit crops. Be aware, though, that while Phytophthora blight and cucurbit downy mildew are both caused by the same type of pathogen and thus are sensitive to similar targeted fungicides, Presidio and Revus are no longer recommended for downy mildew because that pathogen has developed resistance. These materials do still work for Pytophthora blight and are also labeled for pepper and eggplant.

For organic growers, there are several soil-applied materials labeled for use in controlling Phytophthora species including *P. capsici*, and while they may not work as well as targeted synthetic fungicides, they can reduce disease severity and improve yield. Dr. Mary Hausbeck at Michigan State University is a Pytophthora blight expert who has done field trials looking at



efficacy of various fungicides. In 2013 she evaluated some OMRI-approved biofungicides and the results were published in the MSU Extension News for Agriculture newsletter and can be found online at

[http://msue.anr.msu.edu/news/watch\\_for\\_phytophthora\\_on\\_vine\\_crops](http://msue.anr.msu.edu/news/watch_for_phytophthora_on_vine_crops). She found BioTam, Serenade Soil, and Actinovate Ag all significantly reduced plant death and increased yield relative to the untreated control. Each was applied as a soil drench at the base of yellow squash plants grown on black plastic. When she used these biofungicides in rotation with a synthetic fungicide, Presidio, she got even better control, indicating these materials could be used as rotational tools in conventional spray programs.

Management of Phytophthora begins with prevention. Be aware, informed, and proactive. If infections occur, a program that includes multiple control strategies can reduce the pathogen population size over time.

(continued on page 18)

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## VEGETABLE PRODUCTION

## Heat Damage in Vegetables

Gordon Johnson

The current heat wave is causing losses in vegetables and fruits. The following are some effects of high temperatures on vegetable and fruit crops.

The plant temperature at which tissue dies is around 115°F. Normally, plant temperature is just above air temperature. However, plant temperature can rise to a critical level under certain conditions. Plants have 3 major ways in which they dissipate excess heat: 1) long-wave radiation, 2) heat convection into the air and 3) transpiration.

A critical factor is transpiration. If transpiration is interrupted by stomatal closure due to water stress, inadequate water uptake, injury, vascular system plugging or other factors, a major cooling mechanism is lost. Without transpiration, the only way that plants can lose heat is by heat radiation back into the air or wind cooling. Under high temperatures, radiated heat builds up in the atmosphere around leaves, limiting further heat dissipation.

Dry soil conditions start a process that can also lead to excess heating in plants. In dry soils, roots produce Abscisic Acid (ABA). This is transported to leaves and signals to stomate guard cells to close. As stomates close, transpiration is reduced. Without water available for transpiration, plants cannot dissipate much of the heat in their tissues. This will cause internal leaf temperatures to rise.

Vegetables can dissipate a large amount of heat if they are functioning normally. However, in extreme temperatures (high 90s or 100s) there is a large increase the water vapor pressure deficient (dryness of the air). Rapid water loss from the plant in these conditions causes leaf stomates to close, again limiting cooling, and spiking leaf temperatures, potentially to critical levels causing damage or tissue death.

Very hot, dry winds are a major factor in heat buildup in plants. Such conditions cause rapid water loss because leaves will be losing water more quickly than roots can take up water, leading to heat injury. Therefore, heat damage is most prevalent in hot, sunny, windy days from 11 a.m. to 4 p.m. when transpiration has been reduced. As the plants close stomates to reduce water loss, leaf temperatures will rise even more. In addition, wind can decrease leaf boundary layer resistance to water movement and cause quick dehydration. Wind can also carry large amounts of advected heat.

Photosynthesis rapidly decreases above 94°F, so high temperatures will limit yields in many vegetables and fruits. While daytime temperatures can cause major heat related problems in plants, high night temperatures can have great effects on vegetables, especially fruiting vegetables. Hot night temperatures (nights above 75) will lead to greater cell respiration. This limits the amount of sugars and other storage products that can go into fruits and developing seeds.

High temperatures also can cause increased developmental disorders in fruiting vegetables. A good example is with pollen production in beans. As night temperatures increase, pollen production decreases leading to reduced fruit set, reduced seed set, smaller pods, and split sets. Most fruiting vegetables will abort flowers and fruits under high temperatures.

Heat injury in plants includes scalding and scorching of leaves and stems, sunburn on fruits and stems, leaf drop, rapid leaf death, reduction in growth, and lower yields. Wilting is the major sign of water loss which can lead to heat damage. Plants often will drop leaves or, in severe cases, will "dry in place" where death is so rapid, abscission layers have not had time to form.

On black plastic mulch, surface temperatures can exceed 150°F. This heat can be radiated and reflected onto vegetables causing tremendous heat loading. This is particularly a problem in young plants that have limited shading of the plastic. This can cause heat lesions just above the plastic. Heat lesions are usually first seen on the south or south-west side of stems. High bed temperatures under plastic mulch can also lead to reduced root function limiting nutrient uptake. This can lead to increased fruit disorders such as white tissue, yellow shoulders, and blotchy ripening in tomato fruits.

High heat and associated water uptake issues will cause heat stress problems. As heat stress becomes more severe a series of event occurs in plants starting with a decrease in photosynthesis and increase in respiration. As stress increases, photosynthesis shuts down due to the closure of stomates which slows or stops CO<sub>2</sub> capture and increases photo-respiration. This will cause growth inhibition. There will be a major slow-down in transpiration leading to reduced plant cooling and internal temperature increase. At the cellular level, as stress becomes more severe there will be membrane integrity loss, cell membrane leakage and protein breakdown. Toxins generated through cell membrane releases will cause damage to cellular processes. Finally, if stress is severe enough there can be plant starvation through rapid use of food reserves, inefficient food use, and inability to call on reserves when and where needed.

Another negative side effect of reduced plant photosynthate production and lower plant food reserves during heat stress is a reduction in the production of defensive chemicals in the plant leading to increased disease and insect vulnerability.

The major method to reduce heat stress is by meeting evapotranspiration demand with irrigation. Use of overhead watering, sprinkling, and misting can reduce of tissue temperature and lessen water vapor pressure deficit. Certain mulches can also help greatly. You can increase reflection and dissipation of radiative heat using reflective mulches or use low density, organic mulches such as straw to reduce surface radiation and conserve moisture. In very hot areas of the world, shade cloth is used for partial shading to total incoming radiation and heat.

*Dr. Johnson is the Vegetable and Fruit Extension Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 27, Issue 17, July 19, 2019.*

## Managing Phytophthora...

(continued from page 17)

Information from:

- Hausbeck, M.K. & K.H. Lamour. 2004. Phytophthora capsici on vegetable crops: research progress and management challenges. *Plant Disease*. 88(12:1292-1303).
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*Ms. Scheufele is with the Univ. of Massachusetts Vegetable Extension program. From **Vegetable Notes for Vegetable Farmers in Massachusetts**, Univ. of Mass. Ext., Vol. 31, No. 15, July 25, 2019.*

## FRAC Group 11 Fungicides – The Quinone Outside Inhibitors (Qols)

Angie Madeiras

Quinone outside Inhibitors (Qols) are among the most frequently applied fungicides in agriculture worldwide. Unless your farm is certified organic, chances are good that you have used a Qol fungicide in the course of your career. Some of the most widely used strobilurins include Quadris (azoxystrobin), Cabrio (pyraclostrobin), and Flint (trifloxystrobin), for example. But how much do you really know about them? This article provides some information about their background and behavior.

**History** - The Qol fungicides are also sometimes referred to as strobilurins, a name that references their origin. In 1977, a German scientist isolated two fungicidal molecules from the pine cap mushroom, *Strobilurus tenacellatus*, and named them strobilurins A and B. Strobilurin A showed strong antifungal activity in the laboratory, but it was very photosensitive. Chemists modified the molecule to make it more stable in sunlight, and a new class of fungicides was born. The first commercially produced Qols (azoxystrobin and kresoxim-methyl) became available in 1996. By 2013, azoxystrobin (Quadris) was the best-selling fungicide on the planet, accounting for over \$1 billion in sales.

There are currently 20 compounds in FRAC group 11, the fungicide resistance group that includes all Qols. 18 of these compounds are strobilurins, which all end in –strob except for kresoxim methyl. Famoxadone and fenamidone are classified as Qols and therefore included in group 11 but are actually not strobilurins; however, they have the exact same mode of action. In addition to stand-alone products, the Qols have become popular tank mix partners for other fungicides and are frequently found in combination products (e.g. Quadris Opti and Top, Ridomil Gold, Tanos, etc.)

**Mode of Action and Spectrum of Activity** The electron transport chain (ETC) is a cascade of molecular reactions that cells use to produce the energy they need in order to carry out the basic functions of life. Several fungicide classes (including Qols as well as FRAC groups 7, 21, and 45) work by blocking specific steps in the ETC inside fungal cells, thereby preventing them from producing energy. Although these fungicide groups all affect the ETC, they work on different molecular targets within the cascade, and therefore belong to different FRAC groups.

The Qols have an unusually broad spectrum of activity for a systemic fungicide. They are effective against oomycetes as well as several different types of fungi, a fact that contributes at least in part to their popularity. In addition, several Qols are considered “reduced risk” pesticides, meaning that they have a low toxicity to mammals.

The Qols in general are very effective in preventing spore germination and infection. For this reason they are excellent protectants and are best used early in the season to prevent diseases from taking hold. They are less effective against mycelial growth, and have limited effect against fungi inside the plant due to a tendency to bind tightly to plant cuticles. For this reason, the Qols in general have limited curative ability.

**Chemical Attributes** All Qols have translaminar activity and may be referred to as ‘local systemics’. Azoxystrobin and fluoxastrobin also have true systemic activity and will move via the xylem into plant tissues above the point of application. Trifloxystrobin, picoxystrobin, and kresoxim-methyl are sometimes called ‘meso-systemics’ because they also have a vapor phase—they evaporate from treated plant surfaces and move to other plant surfaces by wind currents. It has been shown scien-

tifically that this can increase their effectiveness against some diseases, but it is difficult to determine whether or not the effect is significant.

Qol fungicides have a high affinity for the waxy plant cuticle and bind to it readily; over time, they are gradually released and absorbed into plant tissues. Cuticle binding slows absorption into plant tissue, so the concentration of Qol fungicides within plant tissue can remain low after applications. Pyraclostrobin, kresoxim-methyl, and trifloxystrobin have a higher affinity for the cuticle—full distribution of the fungicide can take several days, and high concentrations of the chemicals in plant tissues is never achieved. Azoxystrobin binds to the cuticle more weakly, and so it can move into plant tissues faster and achieve a higher concentration in plant tissue than some other Qols.

The risk of phytotoxicity increases when Qols are mixed with penetrants, which solubilize the cuticle. Always read product labels and understand what products are compatible with each other.

**Resistance Issues** The highly specific single-site mode of action of the Qol fungicides makes them prone to resistance development. Resistance to Qols is common in some types of fungal pathogens, such as the powdery and downy mildews, whereas it is uncommon in other types, such as rusts. Fungal genetics are responsible for these differences.

Fungicide resistance may be qualitative or quantitative. Qualitative resistance is an all-or-nothing response, in which a

*(continued on page 21)*

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## VEGETABLE PRODUCTION

# Sulfur Deficiency in Sweet Corn and Watermelons

Gerald Brust

In the last few weeks several sweet corn fields as well as some watermelon and even a few tomato fields have been found with sulfur deficiencies (Figs. 1 and 2). In sweet corn, symptoms often appear as green leaves with light yellow or green striping on the newer leaves (Fig. 1). In watermelon symptoms appear as a light green or light yellowing of the leaves of newer growth (Fig. 2). In tomato, unless severe, you usually do not see any visible sulfur deficiency symptoms in the field, but fruit set and quality could be worse. Sulfur is vital to plant growth as it helps develop enzymes in plants. A deficiency in sulfur affects a plant's protein synthesis, structure, and chlorophyll production (hence why plants turn a pale green or light yellow). Overall plant development and growth are stunted without enough sulfur. Newly transplanted vegetables often have a higher mortality rate than is typical.

This is the fourth year that we have seen sulfur deficiencies in at least two of these three crops (it is a bit unusual to see sulfur deficiency in tomato). I have not seen consistent sulfur deficiencies in other vegetable crops over this same time period. Sulfate is relatively mobile in most soils and sulfur deficiencies can occur with heavy rainfalls. Organic matter supplies most of the sulfur to the crop, but sulfur must be mineralized to sulfate-S to be taken up by crop plants. Because mineralization is carried out by soil microorganisms, soil temperature and moisture primarily determine when and how much sulfur is made available to the crop. Excessively wet or dry conditions reduce microbial activity and reduce S availability from soil organic matter. For all the above reasons under field conditions sulfur deficiency and its symptoms can be highly variable. Although sandier soils are much more likely to be deficient in sulfur, I have seen sulfur deficient watermelon and sweet corn in soils with higher levels of clay or organic matter (2-4% OM).



G Brust, University of Maryland

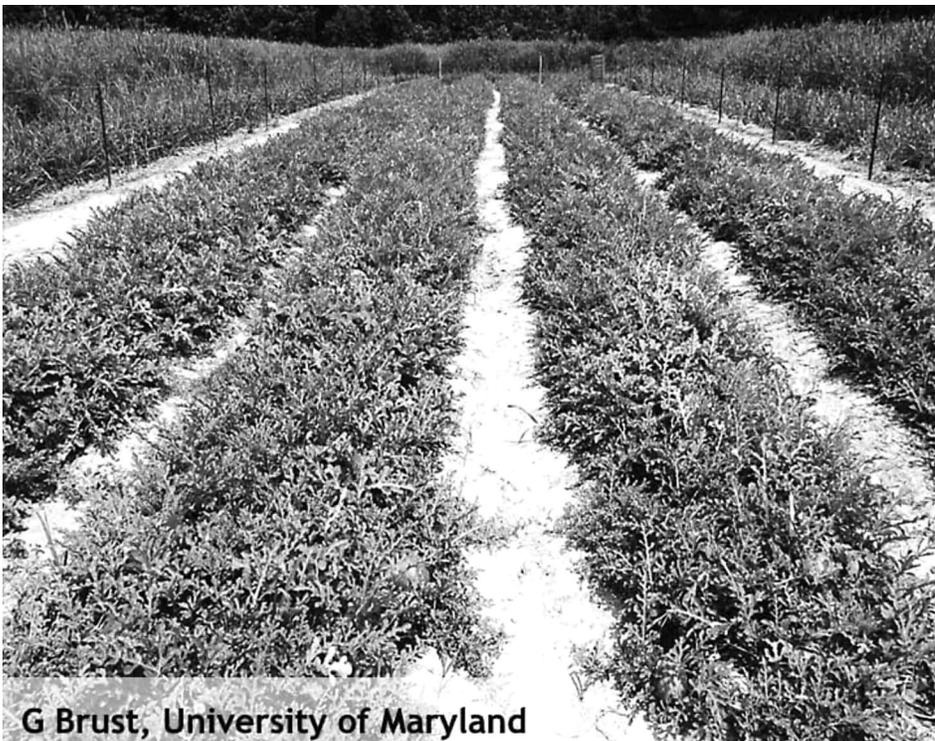
Figure 1. Sulfur deficiency symptoms in older (top) and younger (bottom) sweet corn.



G Brust, University of Maryland

There are other deficiencies that can cause striping or the general yellowing in sweet corn or watermelon respectively and only by conducting a tissue test can you be sure. Sulfur can be added to the crop in combination with several other nutrients such as ammonium and potassium and spray-grade ammonium sulfate is a good choice for foliar applications.

*Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the Weekly Crop Update, Univ. of Delaware Extension, Vol. 27, Issue 17, July 19, 2019.*



G Brust, University of Maryland

Figure 2. Sulfur deficiency in watermelon – foreground melons worse



## Thrips Feeding Damage to High Tunnel Peppers

Gerald Brust

Because of the bright sunny days we have had in the past 3-4 weeks, as well as higher temperatures lately, vegetables in high tunnels (HT) are highly susceptible to thrips and two spotted spider mite infestations because of the hot dry conditions. Peppers are a favorite of thrips as they will feed on the tender developing new leaves and this feeding causes the leaves to have a slight yellowing appearance and become deformed and puckered over time as the leaves expand (Fig. 1). This damage can appear as possible virus infections such as tomato spotted wilt, which some thrips (usually western flower thrips) are capable of transmitting. But infec-



Figure 1. Thrips feeding damage on pepper



Figure 2. Pepper plant with TSWV

tion with the virus causes a more mottled overall-distorted appearance of the foliage (Fig. 2). Growers can monitor for thrips using yellow sticky cards that are placed at the same height as the peppers and checking them 2-3 times a week. Early detection can mean using horticultural oils for thrips control rather than relying on synthetic chemicals such as methomyl, tolfenpyrad, spirotetramat or cyclaniliprole in HTs. Be sure you know how your state regulates pesticide use in HTs.

Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 27, Issue 15, July 5, 2019.

### FRAC Group 11... (continued from page 19)

fungus is resistant to a fungicide regardless of the concentration it's exposed to. Quantitative resistance occurs when the pathogen can survive at low doses of the fungicide but is killed at higher doses. Qualitative resistance the most common type seen with the QoIs—quantitative resistance has been documented, but it is rare.

There is also strong cross-resistance among all QoIs, meaning that if a fungus becomes resistant to one fungicide in the group, it is resistant to all of them. If we are to preserve the usefulness of the Group 11 fungicides, resistance management is critical.

**Resistance Management** Rotating fungicides from different FRAC groups is the most important tool in the box for preventing resistance. Always follow the resistance management guidelines on product labels—the label is the law and will help keep chemistries effective for longer! In addition, there are a few rules of thumb to keep in mind:

- Limit the total number of QoI applications. Product labels often provide information on maximum number of applications allowed per season. If no guidelines are given, make no more than 3 applications.
- Use a maximum of 1 QoI spray out of every three fungicide applications when using a QoI alone (as opposed to a tank mix or combination product).
- Use a maximum of 1 QoI spray out of every two fungicide applications when using tank mix or combination product.
- Do not make consecutive applications of QoI fungicides.
- Tank mix with a contact fungicide or use a combination product containing a contact fungicide (e.g., chlorothalonil, mancozeb, sulfur, oil).

**For more information:** Fungicide Resistance Action Committee (FRAC): <http://www.frac.info/>

Ms. Madeiras is with the Univ. of Massachusetts Plant Diagnostic Lab. From **Vegetable Notes for Vegetable Farmers in Massachusetts**, Univ. of Mass. Ext., Vol. 31, No. 14, July 18, 2019.

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## BERRY PRODUCTION

## Spotted Wing Drosophila Update

Sonia Schloemann

Spotted wing drosophila (SWD) is being found/reported at moderate levels in all counties of [Massachusetts] at this time. It is very important for all fruit growers to take this pest seriously this year. The heat over the coming week may limit population growth somewhat but numbers are climbing rapidly now. Please take a moment to review the recommendations below for managing this very destructive pest.

Basic recommendations for SWD management:

- Strawberries: Renovate promptly as soon as harvest is done. The potential for rapid build-up on fruit left behind prior to renovation is significant. Some states are recommending insecticide spray to the field prior to tilling in order to knock down SWD that might be building up in unharvested fruit. This could be especially helpful if strawberries are near other berry plantings (summer raspberry or blueberry).
- Manage Canopy Environment: Keep rows of raspberries narrow at the base (18") and thin canes to allow 6" between canes if possible to allow for good air circulation and light penetration. In blueberries, eliminate branches below knee high (on mature bushes) that cast shade on the ground and open the upper canopy to allow for good air circulation and light penetration. This will improve spray penetration and efficacy, too. If necessary you can support spreading branches with a make-shift trellis to minimize the shade at the base of the bush. In other berry crops, maintain an open canopy as much as possible.
- Monitor with traps: This is a good practice for earlier in the season to determine when SWD has become active in a location. At this time (mid-July), traps may not provide useful information. Infestations should be assumed in fields with susceptible fruit.
  - However, monitoring traps in sprayed fields can help verify the effectiveness of your spray program.
  - Information about how to set up traps can be found at <http://ag.umass.edu/fruit/resources/spotted-wing-drosophila-monitoring>.
- Good Harvest Practices: Remember to harvest frequently (daily if possible) and thoroughly and avoid allowing fruit to fall to the ground if possible. Training harvesters and/or PYO customers to pick cull fruit into a separate container (with some incentive) can reduce the amount of cull fruit left in the field.
- Postharvest Fruit Handling: Transport harvested fruit as quickly as possible to refrigeration. Holding fruit at 32-33°F can arrest the development of any egg/larvae that may be present in the fruit and maintain fruit quality.
- Spray Practices: Spray recommended materials (organic or conventional) on a tight schedule (5-7 days) once crop is ripening and SWD have been confirmed at or near the crop. Some recommend spraying in the evening to increase residual efficacy because some materials degrade more quickly in sunlight. SWD may also be more active in the evening, especially when the weather is very hot.
  - Also, it is recommended to add 4-16 oz Nu Film P/100 gal with all materials to improve SWD efficacy and, if it rains after you spray, re-apply a pesticide mate-

rial. (Read the label for any re-application restrictions of the same material.)

- See the current list (courtesy of Mary Concklin at UConn Extension) of labeled spray materials for SWD at [http://ag.umass.edu/sites/ag.umass.edu/files/pdf-doc-ppt/2018\\_sw\\_d\\_insecticides\\_for\\_small\\_fruit.pdf](http://ag.umass.edu/sites/ag.umass.edu/files/pdf-doc-ppt/2018_sw_d_insecticides_for_small_fruit.pdf).
- Always read the label of any pesticide material to be sure of rates and restrictions.
- Fruit Sampling: Sample fruit regularly during harvest and do salt flotation test to determine SWD larval presence and density. This is an important practice to establish how well your management program is working and to prevent the sale of infested fruit to your customers. Those customers will be hard to win back. See excellent how-to video at <https://www.youtube.com/watch?v=TXij-udedql>.

*Ms. Schloemann is the Univ. of Massachusetts Extension Fruit Specialist. From **Vegetable Notes for Vegetable Farmers in Massachusetts**, Univ. of Mass. Ext., Vol. 31, No. 14, July 18, 2019.*



*Prune raspberries to allow for good air circulation and light penetration to the base.*



*Simple traps like this, with apple cider vinegar, dish soap, and some optional additives can be deployed in the spring to determine when SWD is active in your area.*

**BERRY PRODUCTION**

**Current Berry Issues**

*Kathy Demchak and Penn State Extension Educators*

Spotted wing drosophila (SWD) numbers are increasing in blueberry and bramble fields. Harvest is underway, so insecticides used now must have a short pre-harvest interval (PHI). Growers should be aware that the PHI for Delegate on blueberries may be reduced from 3 days to 1 day if additional restrictions are followed as specified on the label <http://www.cdms.net/ldat/ld8DM013.pdf>. Also there are Special Local Needs labels in Pennsylvania for Malathion 8F that allow use at an increased rate with a 2-day PHI on blueberries for SWD management <http://www.cdms.net/ldat/ld833007.pdf> and that allow one more application on brambles than the full label allows <http://www.cdms.net/ldat/ld833027.pdf> if used for SWD. This product needs to be used at the maximum rate for best control and may need to be reapplied following rain. With increased use of insecticides for SWD management in brambles, two-spotted spider mite flare-ups are occurring. Symptoms of potato leafhopper damage are being seen in strawberry fields, as are strawberry leaves curling inward from powdery mildew. Raspberry cane-borer is present in plantings. To manage this pest, cut wilted cane tips just below the lower set of punctures that encircle the stem as soon as wilting is noticed and remove the tips from the field. The larvae, even if hatched already, will not yet have had time to tunnel downward in the cane. Defoliation of blueberry plants from yellow necked caterpillar has been seen; the caterpillars usually have moved elsewhere in the planting by the time



*Potato leafhopper feeding injury results in leaf yellowing and distortion. Photo credit: Kathy Demchak.*



*Wilted tip of raspberry cane due to raspberry cane borer; an egg was laid between the two rings of punctures. Photo credit: Kathy Demchak.*



*Section of raspberry cane located between rings of raspberry cane borer punctures. Note recently hatched yellowish larvae which is only about 1/16 of an inch long. Photo credit: Kathy Demchak.*

damage is noticed. With some bright sun at last, sunscald is being seen to a greater extent in raspberries and blackberries.

*Ms. Demchak is with the Department of Plant Science at Penn State Univ. From Penn State Extension.*

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For more information visit [www.nasga.org](http://www.nasga.org), or call Kevin Schooley at 905-735-5379.

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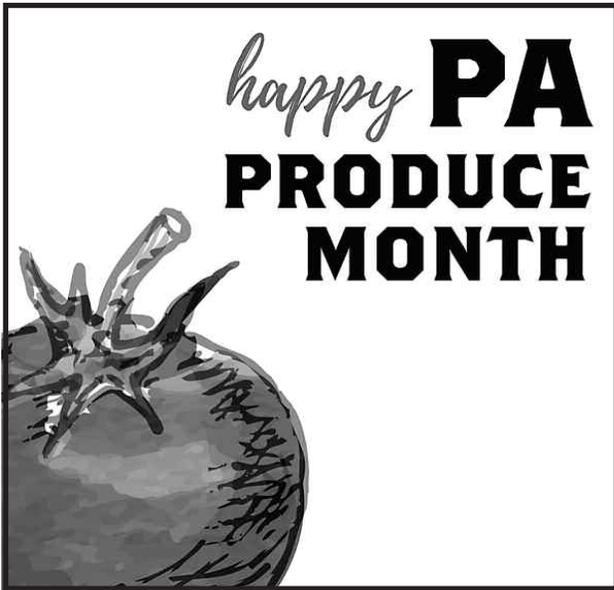
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