PENNSYLVANIA
VEGETABLE GROWERS

NEWS

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for the commercial vegetable, potato and berry grower

When it Comes to Recalls, a Little Planning Could Save The Farm

Amy Philpott

How a Recall Unfolds.
Part 1: The Calm before the Storm

This is the first of a special six-part series called "How a Recall Unfolds," which explains the recall process and offers practical tips on how to prepare for and survive a product recall. It is part of a Specialty Crop Block Grant project designed to help Pennsylvania vegetable growers be prepared to deal with a recall situation.

Carrying out a recall can be a challenge for a fresh produce company of any size, but for farms with limited resources (human and financial), it can be daunting.

All too often produce farms are caught off guard not ever having thought about what to do if they had to issue a recall. This can hurt their ability to protect public health, minimize damage to their reputation, and remain in business. The good news is that a little planning can go a long way in helping a farm meet all of these goals.

A basic recall plan identifies the farm's internal resources, their roles and responsibilities, and list experts who can be called upon to help. Here are more details about how to prepare for the recall you hope never happens.

Identify Your Team.

First, identify the people who can be called upon to help in a recall situation. The farm may be a one -person operation on normal days, but that will not work in a recall situation. If the farm is extremely small, spouses and adult family members may need to help temporarily. The size of the team will vary, but a team of between 5 and 10 people can work well in most cases. In some cases, it may mean getting help from friends, family, consultants, and/or industry associations. It simply isn't realistic to think that it can all be done by one person, take the time now to identify those who can help during a time of need.

Assign Roles and Responsibilities.

Employees will have to take on roles and responsibilities that are outside the scope of their normal, daily jobs. The recall response effort will require decision makers as well as people to communicate with customers, liaison with government officials, contact insurance companies and lawyers, inform employees, oversee consumer communications, and more – so every person counts. Below are typical roles and responsibilities. Keep in mind that the actual division of labor depends on how many people you have on your team and their skill sets.

- Ultimate decision maker. Oversees the entire Recall Team and often also communicates with the farm's employees, lawyers and insurance companies. This person may also be the lead media spokesperson or alternate.
- Primary liaison with government officials and oversees the recall scope determination, health hazard analysis, corrective actions, preventive measures, and product disposition
- Communicates with direct customers and oversees other staff who may also be in contact with customers. Tracks customer communications and compiles customer responses. Compiles the consignee list. May also need to contact venders or logistic providers.

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August is PA Produce Month

For the tenth year, the Pennsylvania Vegetable Marketing and Research Program is celebrating August as Pennsylvania Produce Month. The Program is offering growers and marketers a special point-of-purchase kit that contains large and small posters and special price cards for the month-long promotion of fresh local vegetables. These point-of-purchase materials are also available at the produce auctions across the state. Posters and price cards have also been offered to supermarkets across the state. The Program sent out a press release to newspapers across the state. It has also engaged Penn State Extension in reaching out to consumers with social media – Facebook, Twitter and Pinterest – to remind them that this is the peak season for vegetables. If you are not yet a part of this promotion, please call the Program at 717-694-3596 to see how you can participate

Needed: YOUR HELP at Ag Progress Days

PVGA is again looking for your help at the PVGA Food Booth at Ag Progress Days. We need volunteers all three days to help prepare and serve Vegetable Stir-Fry, Lamb Stir-Fry, Corn-on-the-Cob, Diced Watermelon and Cantaloupe, Strawberry Surprises, Raspberry Lemonade, Blueberry Pie and assorted Whoopie Pies. Plan to come and help out for half a day. The profits from the booth are used to help fund vegetable and small fruit research at Penn State.

Ag Progress Days are August 18 to 20 this year. Shifts are 8:30 a.m. to 1:00 p.m.; 10:30 a.m. to 2:30 p.m. and 1:00 p.m. to 5:30 p.m. Contact PVGA at 717-694-3596 or pvga@pvga.org if you can help. During Ag Progress Days you can text us at 570-541-0737.

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When it Comes to Recalls... *(continued from page 1)*

- Communicates approved messages to suppliers/growers. . Submits the online Reportable Food Registry. Helps implement corrective actions and preventive measures.
- Oversees communication with the general public, including phones, call centers, emails, website, and social media. Draft and/or approve all communications, along with legal counsel. This person may also be the lead media spokesperson or alternate.

Feeling overwhelmed and under-resourced? That leads us to the next section of the recall plan:

Know Who to Call.

It may be necessary to hire outside professionals, either to fill-in resource gaps or to provide additional expertise. No farm wants to become good at recalling product; and you don't know what you don't know, so hire professionals who do know. It could be the difference between a painful recall and a very painful recall. Commonly companies need help with crisis communications, regulatory compliance, and/or the health hazard analysis. Identify experts in these areas ahead of time and keep their contact information readily available. Remember to get cell phone numbers in case you need to reach them after hours or on a weekend. Not sure how to find these professionals? Industry associations often keep resource lists, or ask an industry colleague who has been through a recall or attended a recall education course.

Life is busy; business is (hopefully) busy, and it is easy to be convinced that there just isn't time to prepare for a recall, but there definitely will not be time to figure it out on the fly, and the potential consequences of mishandling a recall are too great to leave to chance. So take advantage of the calm before for the storm and name your internal recall team, assign responsibilities and identify external resources. These first planning steps are the foundation for surviving a recall.

Coming Next Month: *Hello, this is FDA. Are you prepared to do a recall? How a Recall Unfolds, Part 2: Gathering information.*

Amy Philpott is accredited in public relations (APR) and a senior director at Watson Green LLC, a public communications firm in Washington, DC, specializing in reputation management and risk communications in the food and agricultural sectors. She assists fresh produce companies and organizations with crisis and recall communications. She is also an instructor in the United Fresh Recall Ready Program (www.unitedfresh.org/recallready). Amy can be contacted at aphilpott@watsongreenllc.com.

Wanted: OLD PICTURES from Your Farm

To add interest and consumer education value to the PVGA Farm Show Food Booth, Nancy Grace put together a slide presentation of scenes from Pennsylvania vegetable farms using pictures submitted by PVGA members. We have been able to display these pictures on a large screen for customers at the PVGA Booth for the past two years. Since the 2016 Farm Show is the 100th Farm Show, there will be a historical theme this year throughout the Farm Show. Therefore we would like OLD pictures from your farm of planting, harvesting or packing operations as well as your market – either roadside stands or farmers' markets stands. We would greatly appreciate it if the pictures could be scanned as jpeg files and emailed to us pvga@pvga.org. That will eliminate the need for mailing the old pictures and risking their loss.

*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 furture 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 Secretary, at the above addresses.

National News Briefs

House Passes Voluntary Food Labeling Bill

The House of Representatives passed a bill that will allow for a national voluntary labeling system for foods that are not derived from biotechnology. House Bill 1599, the Safe and Accurate Food Labeling Act, will prevent a patchwork of state laws that could require labels on food products that contain genetic modified organisms (GMOs). Pennsylvania Farm Bureau praised the bipartisan support shown in adopting the legislation. "The legislation will protect consumers from confusing and misleading GMO labels and create a voluntary marketing labeling standard based on sound science," said PFB President Rick Ebert. The bill, which passed 275-150, would establish a non-GMO labeling program similar to the current organic labeling program administered by the U.S. Department of Agriculture. It would also affirm the Food and Drug Administration as the leading authority for food safety and labeling. The bill now heads to the Senate for consideration. PFB is urging Pennsylvania Senators Bob Casey and Pat Toomey to support the bill.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 31, 2015.*

Court Backs EPA in Chesapeake Bay Case

The U.S. Court of Appeals for the Third Circuit upheld a lower court ruling that allows the Environmental Protection Agency to move ahead with setting strict guidelines for cleaning the Chesapeake Bay. The court's ruling will allow the EPA to continue with its Total Maximum Daily Load (TMDL) for the Chesapeake Bay Watershed. "We disagree with the court's decision that gives EPA employees the authority to trump local land use decisions in the watershed," said PFB President Rick Ebert. Farm Bureau believes the EPA has overstepped its authority in the Clean Water Act by imposing specific mandates on the amount of nitrogen, phosphorus and sediments to be reduced by farms. Farm Bureau argued the Clean Water Act specifically gives states the authority to develop a reasonable timetables and methods to meet nutrient reduction goals, independently of EPA's arbitrary timelines and regulatory mandates. Farm Bureau was supported by 21 states that filed "friend of the court" briefs in the appeal, along with officials from Cambria, Clearfield, Lancaster, Perry and Tioga counties. Farm Bureau is also deeply concerned with the EPA's lack of full accounting for the conservation practices farmers are currently using to reduce sediment loss and protect water quality. The faulty model used by the EPA to measure Pennsylvania's progress in the bay only captures those conservation efforts that were paid for using federal cost-share money, ignoring the fact that many farmers used their own money-or other sources-for voluntary conservation practices. Pennsylvania Farm Bureau and the American Farm Bureau Federation filed suit against the EPA in 2011.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 17, 2015.*

Attorneys General Sues EPA and Army Corps over Water Rule

Attorneys General from more than 20 states, not including Pennsylvania, are suing the Environmental Protection Agency and the U.S. Army Corps of Engineers over the flawed "waters of the U.S." rule. Led by Wayne Stenehjem, North Dakota attorney general, the lawsuit contends the EPA's actions violate the Clean Water Act, the National Environmental Policy Act and the Constitution.

The EPA's "water of the U.S." rule significantly expands their authority under the Clean Water Act to include ditches and even dry land. The agency contends that these features act as tributaries to "navigable" bodies of water, and therefor fall under federal jurisdiction. The Clean Water Act limits federal oversight to rivers and streams considered navigable.

"This case involves yet another attempt by the federal government to expand its reach and regulatory authority over issues that are primarily reserved to the States," said Stenehjem.

Farmers are concerned the rule could result in the need to obtain federal permits for routine tasks such as crop treatment or nutrient application.

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

AFBF Files Lawsuit on WOTUS

Days after Attorneys General in 29 states sued the federal government, the American Farm Bureau Federation filed a court case seeking to overturn the misguided "waters of the United States" rule. AFBF is joined by other agriculture and industry groups in its lawsuit against the Environmental Protection Agency over the sweeping redefinition of federal jurisdiction governing the Clean Water Act. EPA's WOTUS rule gives federal oversight to miles of small creeks, drainage ditches and even dry land that holds water during a rain event. The AFBF lawsuit claims the new rule grants the EPA sweeping control over land use, far exceeding what Congress had intended with the creation of the Clean Water Act. The suit also claims the vagueness of the rule violates the U.S. Constitution, and challenges the EPA's unprecedented advocacy campaign launched to build support for their rule and ignored concerns voiced by farmers and landowners. "AFBF filed this lawsuit to do everything we can to protect the interests of farmers, but litigation is not a quick or perfect fix," said AFBF General Counsel Ellen Steen. "It is long, cumbersome and expensive and it leaves farmers and others facing immediate harm and uncertainty under this rule." Farm Bureau is also turning its attention to Congress to block the implementation of this rule.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 17, 2015.*

Crop Insurance Programs to Benefit Diversified Farmers

Producers applying for loans through the Farm Service Agency will have the option of enrolling in a new crop insurance program created for diversified farmers. FSA loan applicants will be eligible to enroll in the Noninsured Crop Disaster Assistance Programs (NAP). The program is tailored for farmers who grow non-insurable crops like some fruits, vegetables and other specialty crops.

"FSA is opening its doors wider so that more specialty farmers know of our array of services," said Bill Wehry, Pennsylvania FSA executive director. "And new, underserved and limited income specialty growers who apply for farm loans could qualify for basic loss coverage at no cost, or higher coverage for a discounted premium."

The basic program protects 55 percent of the market price of crop losses exceeding 50 percent of production. Crops covered through the program include vegetables, fruits, mushrooms, aquaculture, honey, maple syrup, grazing and energy

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State News Briefs

Wolf Vetoes Budget

Gov. Tom Wolf vetoed a budget coming from the Republican-controlled General Assembly that did not raise taxes, but increased spending in several areas including basic education.

Republicans said the $30.8 billion spending plan addresses critical areas such as human services and education, but Gov. Wolf said he vetoed the plan over concerns about one-time spending to balance the budget, and the fact that it does not address property taxes. Gov. Wolf is also looking for a severance tax on natural gas for education funding.

The Republican budget contained positive news for agriculture, including an increase in funding for the general operations of the Pennsylvania Department of Agriculture and a $3.3 million boost for Penn State Cooperative Extension, which includes $2 million for avian influenza preparedness and response. However, Gov. Wolf's veto of the full budget bill will require lawmakers to revisit taxes and spending in all areas. Pennsylvania Farm Bureau is continuing to monitor the budget negotiations and advocate for agriculture's priority issues throughout the process.

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

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crops. FSA will also allow beginning or limited income farmers to get NAP coverage for up to 90 days after the normal application closing date when they apply for FSA credit.

Beginning or limited income producers are also eligible for a 50 percent discount on premiums for higher levels of coverage that can protect up to 65 percent of expected production at 100 percent of the average market price. To learn more, contact your local FSA office.

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

Stallman Announces Departure in January

American Farm Bureau Federation President Bob Stallman announced he will not seek reelection in January 2016, following 16 years as the leader of the nation's most influential farm organization. Stallman, a cattle and rice producer from Columbus, Texas, is the 11th president during AFBF's almost 97-year history. "It has been a tremendous honor to serve the nation's Farm Bureau members and represent agriculture and rural America," Stallman said. "After 16 years as AFBF president, six as Texas Farm Bureau president and several more in other Farm Bureau roles, it is time to hand over the reins of leadership-a decision that is made easier by knowing the great leadership and foundation that exist to continue moving Farm Bureau forward. I am as optimistic as ever about the future of American agriculture and Farm Bureau." Farm Bureau has flourished under Stallman's leadership, gaining more than one million members. Programs have grown to broaden the scope and influence of Farm Bureau, including building rural communities and economies. A new AFBF president will be elected to a two-year term at the 97th annual meeting of voting delegates, Jan. 12, 2016 in Orlando, Florida.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 17, 2015.*

Pension Reform Bill Vetoed

Gov. Tom Wolf vetoed a pension reform plan adopted by the Pennsylvania General Assembly that would have moved new state and school district employees out of the state pension system. Gov. Wolf said he vetoed Senate Bill 1 because it did not provide any immediate savings to the state and does not fairly address the lingering problems with the state pension system. Pennsylvania's two public pension systems-one for school districts and the other for state government employees-are underfunded by at least $53 billion due to poor market performance and prior legislative action. While the issue has been debated for several years, Senate Bill 1 was the first time that lawmakers had come to an agreement on the state's ailing pension system. Pennsylvania Farm Bureau supported Senate Bill 1 and will continue to work with lawmakers on legislation that will address the issue. Farmers are concerned that additional property tax increases will be used to fund shortfalls in the pension systems.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 17, 2015.*

Local Tax Bill Passes Pennsylvania Senate

A Pennsylvania Farm Bureau supported bill recently passed the Pennsylvania Senate. Senate Bill 356, introduced by Sen. Mike Folmer, will make the filing of local income taxes consistent with the more simplified methods for reporting and payment of income tax provided under state and federal income tax laws.

Folmer's bill would give farmers the option of making a single filing and payment of estimated taxes, instead of quarterly filings, and allow for "safe harbor" provisions for payment of estimated taxes, based on income from the prior tax year. It would also make the deadlines for local income tax reporting and payment the same as state and federal deadlines. Senate Bill 356 now heads to the House for consideration.

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

New Slate of FFA Officers Selected

The Pennsylvania FFA Association selected a new slate of State Officers for the 2015-2016 school year. The new officers are: State President—Lily Guthrie, Perry County; State Vice President—Tyler Watkins, Huntingdon County; State Secretary—Rachel Greig, Crawford County; State Treasurer—Elizabeth Winklosky, Westmoreland County; State Reporter—Katie Sharrer, Adams County; State Sentinel—Luke Kerstetter, Snyder County and State Chaplain—Jonathan Noss, Perry County. The new officers were chosen during the 86th PA FFA Convention held recently in State College. Officers give up a year of their post-high school career to travel the state promoting agriculture.

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

Bill Introduced to Address Post-Production Costs

A state representative introduced legislation that would require gas companies to pay the state minimum royalty rate to landowners, regardless of the cost of accessing and moving gas to market. House Bill 1391, introduced by Rep. Garth Everett and supported by PFB, would require that gas compa-

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nies pay 12.5 percent as set by state law. Some natural gas companies are taking out so-called post-production costs, reducing the amount that landowners are receiving. Pennsylvania Farm Bureau supports the legislation. Some natural gas companies are taking out so-called post-production costs, reducing the amount that landowners are receiving. Pennsylvania Farm Bureau supports the legislation.

"Some Pennsylvania farmers with gas wells on their properties have been receiving royalty payments far lower than the state guaranteed rate, because gas well companies have been claiming deductions for costs associated with the capture and transmission of gas from the wells," said PFB President Rick Ebert.

Everett, who represents portions of Lycoming and Union counties, said the state's Guaranteed Minimum Royalty Act of 1979 has largely worked throughout its history. However in the past few years with the advent of gas drilling in the Marcellus Shale formation, some companies have charged post-production costs, thereby reducing landowner payments. Many of them were under the impression they were owed the state's minimum royalty payment, he said.

"We have stacks of check stubs that show those payments are well below the state minimum," he said during the news conference. "The industry as a whole has behaved well, but there are some giving the industry a black-eye."

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

Farm Bureau Encourages Farm Exemption in Energy Generation Rules

Pennsylvania Farm Bureau is asking the Pennsylvania Utility Commission to carve out a specific exemption for farms as the commission crafts regulations on energy generation.

The PUC is looking to put limits on the amount of energy that home owners or farmers can generate out of concerns that energy companies might be masquerading as "customer generators."

However, PFB is concerned the move could seriously hamper a farmers ability to pay for renewable energy projects, such as wind, solar and methane digesters, that allow producers to use marginal lands, barn roofs and manure for electricity production.

The PUC has proposed that future energy projects created by "customer generators," (those not considered a utility company) to be allowed to produce no more than 200 percent of their actual electricity consumption. PUC's proposed regulations would not place limits on existing farm energy projects. Farms operating manure digesters, or that have placed solar panels on barn roofs, are considered customer generators.

Pennsylvania Farm Bureau believes any cap on what a farm can generate in electricity will significantly curtail the development of renewable energy projects. Installing systems like solar panels or methane digesters are expensive, and being able to sell electricity back to the grid can help a farmer offset their costs. Farmers have also turned to methane digesters as a way to manage nutrients and potential environmental impacts, while also reducing issues of odor or runoff. Farmers have also used solar panels or wind turbines on marginal land, leading to better management of crop land.

PFB is asking the PUC to make a clear exemption for farms operating energy systems, and for those planning to do so in the future.

*From the **Pennsylvania Agricultural Alliance Issues Update,** Penna. Farm Bureau, July 2015.*

Teachers Learn Agriculture Lessons at Institute

Educators from across Pennsylvania had an opportunity to learn how to include agriculture in their lesson plans at the Educator's Ag Institute, held recently in State College. The nearly week-long workshop gives educators the tools to bring agriculture alive in their classrooms through a variety of lesson plans and workshops. Those lesson plans are adaptable for all types of curriculum and grade levels. Teachers also had the chance to tour nearby farms and research facilities at Penn State. Pennsylvania Farm Bureau's Young Farmer & Rancher Committee also recognized three educators for their efforts to promote agriculture to students. Judy Stayton, a teacher at the Montgomery County Youth Detention Center, received the Outstanding Teacher of the Year Award. She will receive $1,000 to help pay for the cost of attending the 2017 National Ag in the Classroom Conference, along with funds for school supplies. The YF&R Committee also honored Lauren Burgard and Krissann Lambert, teachers at the South Butler School District, as runners' up.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 31, 2015.*

Perdue Supports "Ag on the Go"

The Arthur W. Perdue Foundation provided $20,000 in support to help the new "Ag on the Go" program reach students in urban schools. The Ag on the Go program, operated by the

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AgBiz Masters

A Learning Series for Young & Beginning Farmers

Manage your business for the future.

Enroll in AgBiz Masters and acquire the skills to help you make smart decisions. The next session will be held **November 2015 – March 2016.**

What is AgBiz Masters?

Are you a young or beginning farmer? Are you interested in honing honing your business and financial management skills? If so, AgBiz Masters is for you!

AgBiz Masters is a hands-on, interactive, educational learning series that runs November through March offering a variety of subjects and topics to young and beginning farmers led by industry experts. The program addresses questions and challenges you may have about managing an agricultural business.

The program's blended learning approach includes on-demand, eLearning modules and activities, and face-to-face regional seminars.

The two-year series covers a variety of topics including:

Year one topics:
- Megatrends of Agriculture
- Strategic Business Planning
- Preparing for Your Lender
- Constructing a Balance Sheet
- Constructing an Income Statement and Cash Flow Projection

Year two topics:
- Understanding Lending Decisions
- Farm Business Management Factors and Benchmarks
- Growth and Transition Management
- Personal Financial Management
- Communications, Ethics and Leadership

Participation in AgBiz Masters earns you up to eight (8) SmartStart credits each year from AgChoice Farm Credit and may qualify you for a reduced interest rate on a new AgChoice loan! Learn more about SmartStart at www.agchoice.com/farms/smartstart.

SmartStart
Stimulating Success With Young, Beginning & Small Farmers

AgBiz Masters

A Learning Series for Young & Beginning Farmers

What Does AgBiz Masters Entail?

The online modules take approximately one hour each to complete and include online discussion forums, exams and assignments to relate the topics to your personal farming situation. Since modules, forums, exams and assignments are available online, you can access the materials via the web at your convenience. Text modules and exams are available for participants without internet access.

A regional kick-off meeting and two face-to-face workshops are held to supplement the online learning and allow discussions and feedback among participants and facilitators. These meetings are facilitated by industry experts and provide additional learning opportunities among peers. Workshops are held in 13-15 locations across Pennsylvania, Maryland and other states.

Regional farm tours held across the AgBiz Masters area expose participants to different facets of agriculture.

The time spent in the program and the information learned will prove an invaluable return on your investment, securing a strong future for your business.

Registration Details

The registration fee for one year of AgBiz Masters is $225 and must be received prior to the October 31 deadline. Please note that your $225 fee covers one or two people per registration per year. You may be eligible for additional scholarship reimbursements to help cover the registration cost. For more information on what scholarships you may qualify for, please visit www.AgBizMasters.com.

Registration for AgBiz Masters is easy!

1. Complete the AgBiz Masters registration form or register online at www.AgBizMasters.com.
2. Submit your registration and $225 payment (made payable to AgChoice Farm Credit) by October 31, 2015 to:

   AgBiz Masters
   900 Bent Creek Blvd.
   Mechanicsburg, PA 17050
   717-796-9830 (fax)
   rsattazahn@agchoice.com

To learn more about this program or to request a registration form, please contact Raechel Sattazahn at 800-349-3568 ext. 6016 or rsattazahn@agchoice.com.

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MARKETING

Retail Farm Markets Tour is September 15 & 16

The 19th Annual "Are You Crazy?" Retail Farm Market Tour will visit nine premiere retail farm markets — with plenty of ideas, education, food, and fun for all. The tour is September 15 and 16. This year we are exploring what Pennsylvania, Virginia and West Virginia have to offer. These farms and markets are major providers of fruits, berries, vegetables, prepared foods, and agri-tourism.

We have something for everyone — seasonal, year-round, produce, food, tourism, value-added, pick-your-own, entertainment, and educational farm direct-to-consumer marketing at its finest! Not to mention the "classroom-on-wheels" as we travel between markets with opportunities to network and learn from each other.

The tour is designed for any farm market owner, manager, or other personnel interested in seeing and learning from a variety of retail farm market and agri-tourism entrepreneurs. It is sponsored by the Pennsylvania Retail Farm Market Association, Penn State Cooperative Extension, PVGA, Pennsylvania Department of Agriculture, and USDA Risk Management Agency.

We will tour each operation and focus on what has made it a success. The emphasis is on seeing what others are doing, peer networking, sharing, and learning.

We will be touring:

Windy Knoll Farm Market & Creamery, Chambersburg, PA

Windy Knoll Farm Market & Creamery have a reputation for spotless cleanliness and good customer service. They offer a daily hot food bar, fresh produce, their famous homemade ice cream, deli meats, cheeses, delicious subs, hoagies, baked goods, homemade soups, salads, and bulk foods. A new Sandwich Shop is now open!

https://www.facebook.com/pages/Windy-Knoll-Farm-Market-Creamery/749495641788195

Taylor's Farm Market, Inwood, WV

Owners Bob Taylor and his son Ryan Taylor farm over 1,350 acres of row crops and orchards. The Taylor's farm produces over 130,000 bushels of apples, 5,000 bushels of peaches, cherries, plums, and nectarines that are sold in the farm market along with a huge variety of other local produce. They carry an assortment of West Virginia wines, local honey, jams and jellies, apple butter, sauces from Oliverio's Peppers in Clarksburg, dairy items, organic products, meats, and more. What they don't raise themselves, they buy from local farmers. A soup and sandwich deli opened in June.

http://taylors-farm-market.myshopify.com/

Orr's Farm Market, Martinsburg, WV

Orr's is family owned and operated. Today, George Orr's children and grandchildren are continuing the agricultural path that he paved for them. The business includes pristine orchards, a state of the art packing facility, and farm market.

From the beginning Orr's has depended on extended family and close friends to help bring in the harvests. Without such a dedicated staff of employees their farm would not be what it is today. George S. Orr, Jr. would be proud of what the family has accomplished, but there are many goals still on the horizon. Over the years the Orr family has diversified from the farm market into specialty crops, a pick-your-own operation, bison, and agritourism events and activities.

http://www.orrsfarmmarket.com/

Marker Miller Orchards Farm Market and Bakery, Winchester, WV

Marker-Miller Orchards is a Century Farm that is currently being operated by the fourth and fifth generations of the Marker family. John and Carolyn and their daughter Heather are managing the day to day operations on the farm and at the farm market.

Marker-Miller Orchards has learned that they needed to diversify in order to survive and continue farming. They are focused on growing the best quality of fruit and vegetables and want to ensure that when people visit their farm they not only have a farm experience, but also a family experience. The business includes a farm market, pick-your-own, bakery, kiddieland, weekend wagon rides, and festivals throughout the season.

www.markermillerorchards.com/

Willowsford Farm, Ashburn, VA

As part of the 2,000 acre Willowsford Conservancy, Willowsford Farm manages over 300 acres of agricultural land, growing more than 150 varieties of vegetables, herbs, fruit, and flowers, and raising several breeds of livestock.

The produce is available through the CSA program and at the Farm Market. Each week there is something happening at the Farm Stand located in their Farm Garden such as vendor visits, cooking demonstrations, garden volunteer hours, and farm tours. The Farm hosts educational activities and events, and supports local area businesses as a distribution point for sustainably raised meat, poultry and dairy products.

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Retail Farm Markets... (continued from page 12)

Their mission is to grow healthy food right where people live, and to offer the farm as a place to realize their connections to the natural world and to each other. It is an old model, but new to their community.

http://www.willowsfordfarm.com/

Burnside Farms, Haymarket, VA

Burnside Farms is owned and run by a mother and son team. They plant more than five acres of spring flowers for one of the most spectacular pick-your-own events in North America. In fact, it's now one of the largest pick-your-own flower events in the world! Summer features over 25 varieties of sunflowers. Mid-September marks the opening of the fall market with one of the area's largest selections of pumpkins and gourds, offering more than 50 varieties along with mums, fall plants, fresh cider, tree ripe apples, produce grown on the farm, straw bales, corn stalks. The Burnside barnyard is open for visitors to meet the furry and feathered residents of the farm. Winter features Virginia grown Christmas trees.

http://www.burnsidefarms.com/

Ticonderoga Farm Market, Chantilly, VA

Ticonderoga Farm is very proud of their bees and the award winning dark honey they produce. The farm market has just been redesigned.

Their theme is "Amazing Farm Fun," the place where anything is possible. Their goal is to make the community a healthier place to live, work, and play through experience, recreation, social interaction, learning, growth and relaxation. Ticonderoga offers many festivities annually and each one is designed for an "Amazing Farm Fun" time. The staff strives to meet and exceed customers' expectations. In addition to the planned community events they offer reservations for private events.

http://www.ticonderoga.com/

Stoneybrook Farm and Market, Hillsboro, VA

Stoneybrook is a 45 acre certified organic farm in rural Loudoun County, Virginia. Their mission is to grow quality local organic crops using sustainable practices. They sell their vegetables and fruit through their Farm Market and CSA program. They also sell wholesale to a number of organic produce markets in the greater Washington DC area. Stoneybrook believes in preserving farm land for agriculture and protecting the historical heritage of Northern Virginia. Their soil fertility is maintained through the use of cover crops, compost, and crop rotations. The business includes a farm, farm market and farm festivals.

http://www.stoneybrookfarm.org/

Great Country Farms, Bluemont, VA

Great Country Farms is a 200 acre working farm situated at the base of the Blue Ridge Mountains outside the village of Bluemont, VA. Great Country Farms offers produce, u-pick, fishing, mazes, wagon rides, farm play area, and concession stand as well as the farm experience to its customers. They are also part of the Shenandoah Valley Kids Trail.

The Zurschmeide Family has been farming in Loudoun County for over 35 years and Great Country Farms was started by the second generation of Zurschmeides in Loudoun in 1994. The farm started with a Community Supported Agriculture Program (CSA) which has grown over the years and delivers produce to homes as far as Alexandria and Arlington. In 1996 and again in 2007, the Loudoun County Chamber of Commerce voted Great Country Farms, "Agribusiness of the Year" for its unique efforts to farm in a difficult climate through innovation, rather than selling out and growing houses.

http://www.greatcountryfarms.com/

The tour will stay overnight at the Quality Hotel in Historic Harpers Ferry, WV. Lunch on Tuesday and Wednesday will be at the markets we are visiting. Supper on Tuesday will be on your own. Continental breakfast is included with your hotel reservation.

Pre-registration is necessary because of bus and lodging reservation requirements and will be honored on a "first-come, first-served" basis.

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VEGETABLE PRODUCTION

On the Road - A Visit with Kenny Stehr & Sons Farm

Elsa Sanchez, William Lamont and Tanner Delvalle

On a beautiful summer day we are on the road visiting Brett and Henry Stehr of Kenny Stehr and Sons Farm located in Pitman, Pennsylvania. The farm was started by their father in 1948 and in 1992 Brett and Henry became the owners. Brett runs the marketing side, while Henry runs the production side.

Tanner Delvalle, Henry Stehr and Brett Stehr (left to right).

Fruit and vegetables are grown on 350 acres of the 500 acre farm. Agronomic crops are grown on the remaining acreage. 90% of the harvest goes to several year-round retail markets and the rest is wholesaled. They grow all types of vegetables—as Brett says, "From A to Z".

Part of their marketing strategy is to not compete when there is an abundance of product on the market. For example, they plant early sweet corn on plastic followed by cucumbers for the late season. They also supplement what they grow with products, like bananas and mushrooms, to make it convenient for customers to meet their produce needs at one location. They use social to media to connect with their customers and see the opportunity to expand the use of this technology. Both of the brothers said that the marketing side is harder than the production side.

Water is supplied from the pumping and filtering unit to the field through underground pipe with risers positioned in strategic locations throughout the farm. They double crop on plastic mulch as much as possible. Early crops are harvested and late ones are planted into the same plastic. They've tried degradable mulches in the past, but had issues with it degrading too early in the season resulting in weed problems.

Most crops, except sweet corn, beans, cucumbers and a few others, are started as transplants using 98-, 128-, and 228-cell flats. Henry likes to use Coconut Coir Potting Medium packaged in Quarryville, Pennsylvania. He's used other types, but prefers the drainage with this one.

We came from the trip with the feeling that Brett and Henry love what they are doing and they inherited this passion from their dad. Kenny Stehr & Sons can be found on Facebook at "kennystehr.farm".

Dr. Sanchez and Dr. Lamont are with the Department of Plant Science and Mr. Delvalle is with Penn State Extension in Berks and Schuylkill Counties. From the ***Vegetable, Small Fruit, and Mushroom Production News,*** *Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news, July 22, 2015.*

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On the Road... (continued from page 14)

Each unit also has a Mazzi fertigation injector and can irrigate or fertigate 3 to 5 acres at a time. Units like these probably retail for about $18,000.

Vegetables are irrigated using drip or sprinkler irrigation with the water source being farm ponds. For drip irrigation, 48 inch diameter Fresno Valves and Castings stainless steel sand filters with automated back-flushing and gas engine pumping units are mounted on a trailer. Trailers are positioned near the ponds.

Retail Farm Markets... (continued from page 13)

Registration Deadline: August 14, 2015. All major credit cards and checks accepted. No refunds after August 14, 2015. To register, go online to: http://tinyurl.com/aycTour2015 For assistance with registration: call 610-391-9840, Monday – Friday, 8:00 a.m. to 4:30 p.m.

The registration fee covers the tour bus transportation, one night at a hotel with continental breakfast (supper on your own), reference materials, refreshments, and lunch on both days.

Your registration fee depends on how many you have sleeping in your hotel room:

One person/room tour fee: $290.00
Two people/room tour fee: $235.00 each
Three people/room tour fee: $220.00 each
Four people/room tour fee: $210.00 each

On September 15th we will board the bus at:

6:30 a.m. at Penn State Extension Lancaster County Farm & Home Center parking lot: 1383 Arcadia Road, Lancaster, PA 17601-3184. *Park in the west corner, near Route 30*.

8:00 a.m. at Penn State Extension Adams County parking lot: 670 Old Harrisburg Road, Gettysburg, PA 17325-3404

NOTE: The bus will depart promptly. Please be prepared to be on time, or better, a little early.

On September 16th we expect to return to:
Gettysburg around 5:55 p.m.
Lancaster around 7:35 p.m.

VEGETABLE PRODUCTION

Wanted: Samples of Bacterial Diseases on Tomato (and Pepper)

Beth Gugino

Over the past several years, bacterial diseases have become an increasing problem in tomato and pepper fields across Pennsylvania. Last year it was tomato while this year it seems to be more on pepper depending on where you are in the Pennsylvania.

During the growing season, copper-based products are the primary tool used to reduce bacterial spread within and between plants. Copper is typically applied in a fixed form which lowers its solubility in water. Once applied to the plant surface, copper ions are slowly released when the plant surface becomes wet. When copper ions come in contact with a bacterial cell, they function to denature proteins thereby destroying enzymes necessary for the bacterial cell to function. Since copper is a protectant, once the bacteria enter the plant it is no longer exposed to the copper ions.

One increasing concern is the reduced efficacy of copper due to the development of resistance within the different tomato bacterial populations. In the U.S., bacterial spot resistance to fixed copper has been reported in Florida, Georgia, North Carolina, California, Tennessee, Oklahoma and Ohio while bacterial speck resistance has been reported in California and Virginia. Fortunately, copper resistance has not been reported with bacterial canker. Resistance develops due to selection pressure from frequent use of copper and is distributed through the movement of seed and transplants. In regions where copper resistance is a problem growers have had to reduce their reliance on copper-based fungicides and if used, tank mix it with mancozeb.

In Pennsylvania, it is not known if copper resistance within the bacterial populations affecting tomato is contributing to the increased difficulty growers are having managing these diseases. With support from the Pennsylvania Vegetable Growers Association and Pennsylvania Vegetable Marketing and Research Board, we are collecting tomato (as well as pepper samples since bacterial spot is a major problem this season in some regions) samples. We will isolate the bacteria associated with these samples, determine the genus and species of the bacteria and then screen them for copper resistance. Please contact me by email at bkgugino@psu.ed or by phone at 814-865-7328 if you are interested in submitting a sample or send a sample to 219 Buckhout Lab, University Park, PA 16802. This season, I am also conducting a fungicide evaluation trial for bacterial spot to provide growers with additional information that they can use to make management decisions.

Dr. Gugino is with the Department of Plant Pathology and Environmental Microbiology at Penn State Univ. From the ***Vegetable, Small Fruit, and Mushroom Production News,*** *Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news, July 30, 2015.*

Tomato Ripening Problems

Jerry Brust

Every year about this time I write something about tomato ripening problems I start to see in the field such as blotchy ripening, yellow shoulders, grey wall, internal whitening, etc. By now everyone or most everyone should know that they all have the same root cause; a lower level of potassium (K+) than what is needed by the fruit to ripen properly. One of the more common problems I have seen is internal whitening. Whit this disorder the outside of the tomato appears nice and red, but when cut open there are large areas of white blotches of hard corky tissue which are not confined to the outer wall of the fruit but are found throughout the interior walls of the fruit. We usually find that the soil potassium levels are adequate or even at high levels for K+, but the tissue samples are low to very low in K+ (2.5-1.5%). These maladies usually start to show up in the field in mid to late July when plants are putting on a heavy fruit load and the temperature and humidity are high. The cause is the same, K+ levels too low in the plant. This is often caused by roots that are concentrated in the top 6-8 inches of soil under black plastic, which can raise soil temperatures to the point where the uptake of K+ and other nutrients are reduced enough to cause ripening problems. Some things I have discussed in the past that help reduce these ripening problems include feeding more K+ through the drip, using foliar sprays to add a little more K+, using white plastic mulch instead of black for mid-season tomatoes and using a 30% shade cover over the tomatoes.

Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the ***Weekly Crop Update,*** *Univ. of Delaware Extension, Vol. 23, Issue 16, July 10, 2015.*

Garlic Harvest, Curing and Storage

Ruth Hazzard

Many farmers are beginning to think about harvesting garlic, a big task that usually occurs around mid-late July. Timing the harvest can be tricky—heads should be left in the ground as long as possible to attain maximum bulb size (which doubles in the last stage of growth), but not so long that the cloves begin to separate, as overripe bulbs sell and store poorly. Harvest when leaves begin to turn yellow, but when about 60% are still green. Check bulbs by cutting through the head sideways to see how well developed the cloves are. Cloves should fill the wrappers - if they seem a little loose, the garlic has a little ways to grow. A little of the very outer wrapper may have started to discolor at this point. Harvest before the bulbs pop, which can happen relatively quickly, especially in a wet year. Remember that it is better to harvest too early than too late.

Use hand tools to loosen soil under the bulbs or a mechanical harvester to undercut the bed. Pulling bulbs out when they are tight in the ground can open wounds at the stem-bulb junction and allow for fungal infections. Fresh bulbs bruise easily and these wounds can also encourage infection. Don't knock off dirt by banging bulbs against boots, shovels, or buckets – shake or rub gently, and leave the rest to dry out during curing.

Curing is important for successful bulb storage and finding the ideal conditions for curing can also be a challenge. Curing in the field runs the risk of sunscald, while poorly ventilated barns can result in loss from disease. Avoid high temperatures (over 90°F) and bright sunlight. Rapid curing can be achieved by placing bulbs roots up on 1" wire mesh in a hoophouse covered with a shade cloth, and with the sides and ends open. A well-ventilated barn will also work, but be sure that bulbs are hung with adequate air circulation or on open racks up off the floor. Curing takes 10-14 days. Stems may be cut before or after curing. Curing is complete when the outer skins are dry and crispy, the neck is constricted, and the center of the cut stem is hard.

Storing Bulbs. After curing, garlic can be kept in good condition for 1 to 2 months at ambient temperatures of 68 to 86 °F under low relative humidity (< 75%). However, under these conditions, bulbs will eventually become soft, spongy and shriveled due to water loss. For long-term storage, garlic is best maintained at temperatures of 30 to 32°F with low RH (60 to 70%). Good airflow throughout storage containers is necessary to prevent any moisture accumulation. Under these conditions, well-cured garlic can be stored for 6-7 months. Common storage using cool night air may be adequate for 3-4 months, but it is important to select a place with low relative humidity and good air flow. As with onions, relative humidity needs to be lower than for most vegetables because high humidity causes root and mold growth; on the other hand, if it is too dry the bulbs will dry out.

Storing Seed. Garlic bulbs that are to be used as seed for fall planting of next years' crop should be stored at 50 °F and at relative humidity of 65-70%. Garlic cloves break dormancy most rapidly between 40 to 64 °F, hence prolonged storage at this temperature range should be avoided. Storage of planting stock at temperatures below 40°F results in rough bulbs, side-shoot

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VEGETABLE PRODUCTION

Watch Out for Spider Mites in High Tunnels in Hot Weather

In hot dry weather spider mite populations can spike quickly. Although the weather this summer has been far from dry, where high tunnels have protected from the frequent rains, spider mites have been a problem.

Spider mite damage on tomatoes causes stippling, yellowing and bronzing of leaves.

Damage - Spider mites cause stippling or bronzing of leaves as their feeding destroys the chlorophyll. At first glance it can be confused with nutritional problems. Heavily infested plants will have webbing on the undersides of leaves and sometimes between leaves. Crop losses occur when about 30% of the leaf surface is damaged.

Scouting - Don't wait until damage is severe enough for you to see symptoms. A good way to detect mites is to tap the leaves over a sheet of white paper. When there are mites they will fall onto the paper looking like tiny moving dots. Use a good hand lens to view and identify the mites.

Two spotted spider mites have two distinct spots on their backs. Broad, cyclamen mites, and eriophyid are also mites to look out for.

Spider mite webbing indicates high levels of mites.

Control - Phytoseiulus persimilis is a predatory mite which is a mainstay for spider mite control. They are active year round and feed on spider mite eggs, larvae, nymphs, and adults. They reproduce faster than the spider mites when temperatures are above 82F.

Tap leaves over white paper to find mites.

Neoseiulus californicus is another predatory mite. It can be used preventively because it can survive in the absence of prey. Start early to control spider mites with predator mites. If you have an active spider mite population introduce *Phytoseiulus* and *Neoseiulus.* Ultra vine horticultural oil and insecticidal soap are low residual toxicity pesticides that provide control with little impact on natural enemies.

See your most recent Commercial Vegetable Guide for mite sprays. For tomatoes Agri-Mek, Acramite 50WS, Portal, and Oberon 2SC are listed in 2015. Keep in mind, thorough spray coverage is important. These sprays are not compatible with a biological control program.

Resources available from Penn State Extension

- Commercial Vegetable Guide – http://extension.psu.edu/plants/vegetable-fruit/production-guides
- Greenhouse IPM with an Emphasis on Biocontrols - http://extension.psu.edu/pests/ipm/agriculture/greenhouse/greenhouse-manual
- Vegetable Integrated Pest Management with an Emphasis on Biocontrols - hhttp://extension.psu.edu/publications/agrs-128

*From the **Vegetable, Small Fruit, and Mushroom Production News,** Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news, July 21, 2015.*

Garlic Harvest... *(continued from page 17)*

sprouting (witch's-brooms) and early maturity, while storage above 65°F results in delayed sprouting and late maturity.

Garlic cloves used for seed should be of the highest quality, with no disease infections, as these can be spread to new fields and to next years' crop. Be on the lookout for garlic blight nematode which may have been distributed around New England on infested seed garlic. This nematode, which is also known as a bulb and stem nematode, causes bloated, twisted, swollen leaves, and distorted and cracked bulbs with dark rings. Infestation with this nematode can weaken plants, causing them to be susceptible to secondary infections. The UMass Plant Disease Diagnostic Lab can make a positive identification; call 413-545-3209 to submit a sample.

*Ms. Hazzard. is with Univ. of Massachusetts Ext. Information taken from New England Vegetable Mgt Guide, Oregon State, ATTRA, Wishingstone Farm, Astarte Farm. From **Vegetable Notes for Vegetable Farmers in Massachusetts,** Univ. of Massachusetts, Vol. 26, No. 13, July 10, 2014.*

State News Briefs *(continued from page 8)*

Pennsylvania Friends of Agriculture Foundation, kicks off in September in Philadelphia. Throughout the year it will also visit schools in Harrisburg, York and Pittsburgh. The support of Perdue, along with the American Agriculturalist Foundation, Pennsylvania Beef Council and Pennsylvania Pork Producers, will allow the Pennsylvania Friends of Agriculture Foundation to provide science lessons to children in third to fifth grades. "We created Ag on the Go in order to provide fun, hands-on, science-based experiments focusing on food nutrition, farming and the environment to inner city schools that typically are not served by our Mobile Agriculture Education Science Labs," said Pennsylvania Farm Bureau President Rick Ebert, who serves as chairman of the Friends of Agriculture Foundation. "A huge benefit of the new program is that it can be especially helpful to school districts struggling with tight budgets." PFB is thankful for the support from Perdue and other organizations. Learn more about Ag on the Go at: www.pfb.com/agonthego.

*From **Farm Bureau Express,** Penna. Farm Bureau, July 31, 2015.*

Late Blight is Rapidly Spreading Across New York

Beth Gugino

Late blight has now been confirmed in 10 counties in New York as well as in Ontario Canada, Connecticut, New Jersey, Maryland and in one county in Pennsylvania (on potato). Reports have been on both tomato and potato.

*Growers who want up-to-date information on vegetable diseases like late blight and downy mildew as well sweet corn insect pest monitoring should subscribe to the P**A Vegetable IPM Weekly Update** – it is free from the PA Vegetable Marketing and Research Program by email, fax or regular mail. Call 717-694-3596 or email pvmrp@embarqmail.com.*

One disease that could be easily confused with late blight on tomato is grey mold caused by Botrytis cinerea. This disease is most common observed in high tunnels and is associated with high relative humidity and cool temperatures which describes much of the season up until recently. In a 'typical' year, it is most common in early spring or fall and is associated with dying plant tissues. It is common for stems to become infected through leaf scars or from senescent flowers that come in contact with the stem or other plant parts. On leaves the lesions can be irregular in shape and can develop wide concentric rings and are tan in color (see picture below). Grey-brown fuzzy sporulation can develop on any infected plant surface. This pathogen has a very wide host range and is primarily managed through ventilation, high tunnel sanitation and fungicides if needed.

The late blight samples collected from the commercial potato field and potato cull pile in Erie Co., PA have been genotyped as US-23. The predominant genotype observed infecting both potato and tomato over the past several years.

US-23 continues to be the predominant genotype on both tomato and potato hosts this season. This particular genotype is characterized as going to both tomato and potato and is sensitive to the fungicide active ingredient mefenoxam. Keep in mind that the pre-harvest interval can vary depending on the crop and product formulation.

Within the past few days there have been several additional reports of late blight on potato in central NY (Oneida Co.) and on tomato in western NY near Buffalo and in Ulster Co. in southeastern NY and in western CT.

Symptoms on tomato and potato are very similar and any plant growth stage is susceptible. It is important to be scouting your crop regularly looking for irregularly shaped water-soaked lesions that are initially pale green before turning gray- brown. Under humid conditions, the lesions on the underside of the leaf will sporulate giving them a white fuzzy appearance. The lesions will tend to develop on the upper to middle part of the plant as opposed to early blight and Septoria leaf spot (tomato only) that start on the lower leaves and progress up the plant.

Keep in mind, unless you have planted a late blight resistant tomato cultivar (e.g. Plum Regal, Mountain Magic, Mountain Merit, Defiant, Iron Lady) the only way to manage late blight during the growing season when conditions are favorable for disease is with the use of protectant and/or late blight specific fungicides. Without careful scouting and the use of fungicides, you could potentially lose your crop in as few as 5 days. Given

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VEGETABLE PRODUCTION

Fruit Set Problems and Pollination Disorders in Fruiting Disorders in Fruiting Vegetables

Gordon Johnson

Vegetable harvest is peaking on Delmarva. Unfortunately, we often see pollination problems in fruiting vegetables when weather conditions are unfavorable and 2015 is no exception.

Signs of incomplete pollination in cucurbits include bottle-necked fruit or fruit with a pinched end, crooked or lopsided fruit, fruit small in size or nub-like; and fruits with prominent lobes or that are triangular in shape. Causes of incomplete pollination may be inadequate pollen transfer by pollinating insects; inadequate pollen sources (pollenizers); or hot, dry weather that reduces pollen viability or that desiccates flower parts during pollination. Research has shown that a minimum of 1,000 grains of pollen are required to be distributed over the three lobes of the stigma of the female flower of a watermelon to produce a uniformly shaped fruit.

Hollow cavities in fruit and vacant seed cavities are related to lack of seed formation, again traced back to poor pollination. Fruit tissue separation, such as hollow heart in watermelon, has also been linked to inadequate pollination and may be worsened by rapid fluctuation in environmental conditions affecting fruit development.

Each year we see pumpkin fields with poor fruit set or fruit carry. Remember that in larger pumpkin sizes, each plant will only carry one to two fruits. The large vining plants also need considerable space – 25 to 50 square feet per plant. While planting Jack-o-lantern types at higher densities might at first seem to be a way to achieve higher yields, interplant competition will increase and you can decrease fruit carry because of this competition.

Too much available nitrogen can also delay pumpkin fruit set so that many of pumpkins that are produced do not reach maturity in time. Pumpkins do not normally need more than 80 lbs/acre N to grow a crop. Anything above 100 lbs/acre N will cause the pumpkins to put on excessive vine growth and limit fruiting.

A major reason for poor fruit set in some years is high temperatures during flowering in July. Day temperatures in the 90s or night temperatures in the high 70s will cause flower and small fruit abortion. For pumpkin growers that do wholesale and start shipping right after Labor Day, this will limit early pumpkin availability. Varieties vary considerably in their ability to tolerate heat and to set under hot conditions. Inadequate irrigation and excessive water stress can also reduce fruit set, increase abortions, and reduce fruit carry. High temperatures and water stress reduce photosynthesis and the ability of the plant to carry fruits. Drought can also cause a higher than normal male/female flower ratio, thus affecting the number of fruits per plant.

Sweet corn growers often see quality problems related to poor pollination as a result of high temperatures. This problem is more severe in less stress tolerant varieties and where irrigation is inadequate.

In corn silk elongation begins seven to ten days prior to silk emergence from the husk. Every potential kernel (ovule) on an ear develops its own silk that must be pollinated in order for the ovary to be fertilized and develop into a kernel. The silks from near the base of the ear emerge first and those from the tip appear last. Under good conditions, all silks for an ear will emerge and be ready for pollination within a span of 3 to 5 days and this usually provides adequate time for all silks to be pollinated before pollen shed ceases.

Pollen grains are borne in anthers, each of which contains a large number of pollen grains. The anthers open and the pollen grains pour out after dew has dried off the tassels. Pollen is light and can be carried considerable distances (up to 600 feet) by the wind. However, most of it settles within 20 to 50 feet. Pollen shed is not a continuous process. It stops when the tassel is too wet or too dry and begins again when temperature conditions are favorable.

Under favorable conditions, a pollen grain upon landing on a receptive silk will develop a pollen tube containing the male genetic material, develop and grow inside the silk, and fertilize the female ovary within 24 hours. The amount of pollen is rarely a cause of poor kernel set. Each tassel contains from 2 to 5 million pollen grains, which translates to 2,000 to 5,000 pollen grains produced for each silk of the ear shoot.

Poor seed set is often associated with poor timing of pollen shed with silk emergence (silks emerging after pollen shed). Shortages of pollen are usually only a problem under conditions of extreme heat and drought. Extreme heat and desiccating winds can affect pollen germination on silks or pollen tube development leading to poor seed set. Insects that clip silks during pollination can cause similar problems.

In tomatoes, day temperatures over 95°F and/or night temperatures in excess of 80°F can cause pollination problems due to reduced pollen production, reduced pollen viability, or reduced pollen germination or pollen tube production. This can lead to flower drop, smaller fruit, misshapen fruit, or reduced gel formation inside the fruit producing hollow areas. To manage

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Late Blight... *(continued from page 19)*

the persistent high relative humidity and frequent rain events, protectant fungicides are recommended. For organic production, copper is still one of the most effective in-season tools and is most effective when applied before symptoms are observed. Copper tank mixed with Actinovate and alternated with copper tank mixed with Regalia would be one suggested organic program. Since Regalia functions to boost the plants defense system, initiating applications early in the season is recommended.

If you suspect late blight on your farm, please contact your local Penn State Extension Office or let me know via email (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. Additional images of late blight on tomatoes and potatoes can be found at the Penn State Extension Vegetable and Small Fruit website under the Vegetable Disease Images link on the homepage (http://extension.psu.edu/plants/vegetable-fruit). 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 with the Department of Plant Pathology and Environmental Microbiology at Penn State Univ. From the ***Vegetable, Small Fruit, and Mushroom Production News,*** *Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news, July 22 and 28, 2015.*

Reports of Cucurbit Downy Mildew Increase Across the Region

Beth Gugino

In Pennsylvania downy mildew has now been confirmed on cucumber in Lawrence, Elk and Berks Counties, on butternut squash in Lancaster and Columbia Counties and on jack-o-lantern type pumpkin in Clinton County.

In PA, we tend to see downy mildew on cucumbers annually but not necessarily on other cucurbit hosts or if we do it tends to be later in the season. Pumpkins are an important crop in PA. Due to the confirmation on pumpkin in Clinton County, it is important that pumpkin growers start including downy mildew specific fungicide in their spray programs especially in the central part of the state. Some of the more effective products include Ranman, Previcur Flex and Zampro for longer season cucurbit crops like pumpkin and winter squash Revus and Presidio are also effective. Programs should rotate between different FRAC codes and should be tank-mixed with a protectant for resistance management. For a more complete list of recommended fungicides see the 2015 Commercial Vegetable Production Recommendations for PA. For organic production, copper remains the primary tool and can be used in combination with products like Serenade, Regalia and Actinovate for suppression.

If growing successive cucurbit crops, disking-in or removing the crop residue once done with harvest with reduce further spread within not only your farm but also nearby neighboring farms and farms within the region.

Optimum conditions for infection include temperatures between 59 and 77'F with 2 to 5 hours of dew or fog. I know in State College this morning the thick fog did not burn off until 10am. The purplish-grey sporulation on the underside of the leaves will also develop under similar temperatures and a 6 hour dew period however, it is the drop in relative humidity that triggers the spores to be released and available to start new infections. Keep in mind that these conditions often occur overnight and during the early morning hours.

For the latest information on outbreaks and to receive email or text alerts please visit the Cucurbit Downy Mildew Forecasting website at http://cdm.ipmpipe.org/index.php. Updates will also be made to the 1-800-PENN-IPM hotline weekly or more frequently if needed to provide growers with information that can be used to help make timely management decisions. The forecasted risk maps are also based on knowing where there are downy mildew infected fields (sources of the pathogen) so it is important if you suspect downy mildew on your farm to let me know either by email (bkgugino@psu.edu) or by phone at 814-865-7328 or contact your local Penn State Cooperative Extension Office.

Dr. Gugino is with the Department of Plant Pathology and Environmental Microbiology at Penn State Univ. From the ***Vegetable, Small Fruit, and Mushroom Production News,*** *Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news, July 28, 2015.*

VEGETABLE PRODUCTION

Heat Effects on Vegetable and Fruit Crops

Gordon Johnson

2015 has not been an excessively hot year. However, we have recently had some typical July weather with high temperatures and high humidity. 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 in the 80s) 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 temperatures increase, pollen production decreases leading to reduced fruit set, reduced seed set, smaller pods, and split sets.

Heat injury in plants includes scalding and scorching of leaves and stems, sunburn on fruits and stems, leaf drop, rapid leaf death, and reduction in growth. 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.

There are three types of sunburn which may have effects on fruits and fruiting vegetables. The first, sunburn necrosis, is where skin, peel, or fruit tissue dies on the sun exposed side of the fruit. Cell membrane integrity is lost in this type of sunburn and cells start leaking their contents. The critical fruit tissue temperature for sunburn necrosis varies with type of fruit. For cucumbers research has shown that the fruit skin temperature threshold for sunburn necrosis is 100 to 104°F; for peppers, the threshold is 105 to 108°F, and for apples the critical fruit skin temperature is 125-127°F. Fruits with sunburn necrosis are not marketable.

The second type of sunburn injury is sunburn browning. This sunburn does not cause tissue death but does cause loss of pigmentation resulting in a yellow, bronze, or brown spot on the sun exposed side of the fruit. Cells remain alive, cell membranes retain their integrity, cells do not leak, but pigments such as chlorophyll, carotenes, and xanthophylls are denatured or destroyed. This type of sunburn browning occurs at a temperature about 5°F lower than sunburn necrosis (115 to 120° F in apples). Light is required for sunburn browning. Fruits may be marketable but will be a lower grade.

The third type of sunburn is photooxidative sunburn. This is where shaded fruit are suddenly exposed to sunlight as might occur with late pruning, after storms where leaf cover is suddenly lost, or when vines are turned in drive rows. In this type of sunburn, the fruits will become photobleached by the excess light because the fruit is not acclimatized to high light levels, and fruit tissue will die. This bleaching will occur at much lower fruit temperatures than the other types of sunburn.

Leaf scald occurs most commonly when temperatures are in the high 90s. At these air temperatures, crop leaf temperatures may rise to a critical level where plant cells are damaged and they desiccate quickly, leaving the scalded appearance. Upper leaves are the most exposed to radiation from the sun and therefore the most susceptible. Drying winds and low humidity will make scald more severe. Any interruption in transpiration during this period will increase leaf temperature even more and make scald more severe.

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 CO2 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 generat-

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Helping Fruit Set in Tomatoes

Jerry Brust

The high temperatures we have had recently, with daytime highs at 90°F and above and nighttime lows only getting down to 70°F in much of the mid-Atlantic may cause blossom drop and fruit abortion in tomatoes. Ordinarily in tomato fields, pollination is achieved just by the action of the wind. Pollen is released from the tomato flower and falls onto the stigma. Without pollination flowers die and drop. In tomatoes the pedicle turns yellow before the flower falls from the plant. Tomato flowers must be pollinated within approximately two days of becoming viable or they will abort. Tomato plants can tolerate extreme temperatures for short periods, but several days or nights with temperatures above 86°F (daytime) or 70°F (nighttime) will cause the plant to abort flowers. At these temperatures the pollen can become sticky and/or nonviable, preventing pollination from occurring. The relative humidity also plays a role in pollination with high levels (>80% RH) during pollen shed causing the pollen to be release improperly, resulting in poor or incomplete pollination.

There are some possible remedies to these high temperatures that could increase pollination and fruit set. One of the things I have been working on the last several years is using shade cloth that is draped over the tomato stakes when plants begin to set fruit. Timing of the shade cloth is important, as you cannot put it over the plants during vegetative growth as this will decrease growth. However you also cannot wait too long after fruit set begins or you will lose the advantages of the shade on fruit quality. In my studies with shade cloth and tomatoes, yields were increased in the shaded areas by an average of 30%, quality and size of tomatoes increased significantly when the same varieties were shaded vs. when they were not. Two years ago, when it was not very hot and we had good rainfall throughout the summer yields still increased in the shaded areas vs non shaded areas by about 15%. I do not think growers should go out and cover all of their tomato fields with shade cloth, but it could be used for certain tomato varieties that are grown because customers really like them, but the tomatoes just do not produce well in the summer heat. This shade method does not work inside high tunnels as the entire structure needs to be covered to reduce heat, not just the rows inside. There are other trials being conducted to help tomatoes and other vegetables come through the heat, but those results will have to wait.

*Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update,** Univ. of Delaware Extension, Vol. 23, Issue 16, July 10, 2015.*

Heat Effects... *(continued from page 22)*

ed 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. 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 reduce advected heat and total incoming radiation.

Control of sunburn in fruits starts with developing good leaf cover in the canopy to shade the fruit. Fruits most susceptible to sunburn will be those that are most exposed, especially those that are not shaded in the afternoon. Anything that reduces canopy cover will increase sunburn, such as foliar diseases, wilting due to inadequate irrigation, and excessive or late pruning. Physiological leaf roll, common in some solanaceous crops such as tomato, can also increase sunburn.

In crops with large percentages of exposed fruits at risk of sunburn, fruits can be protected by artificial shading using shade cloth (10-30% shade). However, this is not practical for large acreages. For sunburn protection at a field scale, use of film spray-on materials can reduce or eliminate sunburn. Many of these materials are Kaolin clay based and leave a white particle film on the fruit (such as Surround, Screen Duo, and many others). There are also film products that protect fruits from sunburn but do not leave a white residue, such as Raynox. Apply these materials at the manufacturer's rates for sunburn protection. They may have to be reapplied after heavy rains or multiple overhead irrigation events.

*Dr. Johnson is the Extension Vegetable & Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update,** Vol. 23, Issue 18, July 24, 2015.*

Phytophthora Fruit Rot

Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland;keverts@umd.edu

June was very favorable for the development of Phytophthora fruit rot in several Delmarva watermelon fields. Conditions that favor Phytophthora fruit rot are rainfall amounts that lead to saturated fields for several hours. For example, we have had many heavy rains that produced up to 2 inches or more of rain and resulted in pooling in fields. When soil is saturated for 5 to 6 hours, the disease progress is greatly increased. Optimum temperature for the disease is 82°F, and it will spread well even at higher temperatures.

The best way to manage Phytophthora fruit rot is to implement good cultural disease management practices such as removing infected debris and diseased fruit from fields, using raised beds, and improving soil drainage through tillage. Also avoid susceptible host plants in the field rotation (snap and lima bean, cucurbits, eggplants and tomatoes).

Several trials have been conducted in the last 10 years by Dr. S. Kousik in South Carolina to evaluate efficacy of fungicides on managing Phytophthora fruit rot in watermelon. In these trials, Revus, Presidio and Zampro were the products that were most often included in the best treatment programs. In addition, Prophyt also improved management. One example of a good program for Phytophthora fruit rot is Actigard plus Prophye plus Kocide applied and alternated with an application that includes Zampro, Revus or Presidio. While it is expensive, Zampro applied four days before harvest performed well on post-harvest efficacy, which should relate to reduced disease

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Leaf Miners

Tianna DuPont

Leaf miners seem to be especially noticeable this spring in both conventional and organic fields. If you are seeing white meandering tunnels in your beet, spinach and chard leaves you are not familiar with, read on for management tips.

Leaf miner damage.

Leaf miner in spinach.

Leaf miner eggs.

Damage - Larvae mine their way through leaves creating blisters that often look like meandering tunnels. In spinach and chard affected leaves are not marketable. Affected beets may not be marketable with tops, but damage is rarely high enough to defoliate to the point of effecting sizing up of beets.

Life Cycle - Leaf miner damage is caused by the legless yellow to white larvae which burrow between the layers of the leaves as it feeds. The mature larva cuts a hole in the leaf and drops to the ground to pupate. It emerges 2-4 weeks later as a fly. This fly lays small white eggs, generally on the underside of the leaf. Eggs hatch in 3-6 days. Often there are several larvae within each mine. In Pennsylvania there are several generations per year: taking about 30-40 days per generation Leaf miners over-winter as pupae in the soil or plant debris and emerge as adult flies in the spring.

Either the spinach leafminer or the beet leafminer cause this damage, and both have similar lifecycles. Both were introduced from Europe, probably in the 1800's. Many weeds serve as hosts, including lambsquarter, pigweed, henbane, and nightshade.

Scouting - Early detection is important. Check young seedlings weekly for mining on the cotyledons and first true leaves. Look for clusters of small white eggs, mines and hatching larvae. Examine ten plants in ten locations. Be sure to examine the undersides of leaves.

Controls - Weed control helps reduce populations. Historically, these have been more of a problem in gardens and small plantings, as opposed to larger weed-free fields. Your leaf miner problem may be a weed problem! If you are harboring high levels of lambsquarter, amaranth and other weed hosts you will likely battle leaf miner during peak flight regardless of chemical controls.

If detected early in smaller plantings, removing infected leaves can suppress the problem.

Rotation is important away from spinach, chard, and beet hosts. Pupae overwinter in soil and crop debris of host fields, including weed hosts.

Many naturally occurring parasitoids and predators attack leaf miners. Consider whether your pesticide use might be reducing parasitoid populations and encouraging outbreaks.

In smaller plantings use floating row cover to prevent egg laying.

Till the soil in early spring to disrupt life cycle and kill overwintering pupae.

Most pesticides are ineffective against larvae because the miners are protected inside of the leaf. Spinosad/Spinetoram products (Entrust, Radiant) have activity if residues are present on the leaf surface.

Systemic pesticides, either through the soil or translaminar activity to penetrate the leaf can be effective. Care must be taken (accurate rates, and follow days-to-harvest interval) to avoid residues in the marketed product. Products in this category include chlorantraniliprole (Coragen), abamectin (Agri-Mek), cyromazine (Triguard), dinotefuran (Scorpion, Venom).

Efficacy improves with the use of an adjuvant.

Further Information

Production Guide for Organic Spinach - http://nysipm.cornell.edu/organic_guide/

Commercial Vegetable Production Recommendations - http://extension.psu.edu/publications/agrs-028/view

Ms. DuPont is with Penn State Extension in Lehigh and Northampton Counties. From the ***Vegetable, Small Fruit and Mushroom Production News,*** *Penn State Extension, http://extension.psu.edu/vegetable-fruit/news, May 28, 2015.*

Fruit Set Problems... *(continued from page 20)*

these pollination related problems in tomatoes use "hot-set" type tomatoes bred for better production under heat conditions. Use hot-set varieties for plantings where high temperatures are expected during pollination.

In snap beans and lima beans, plantings that flower and set pods during summer conditions when day and night temperatures are high will be susceptible to reduced sets and yields, split sets, small pods, and misshapen pods. Most of our currently grown lima bean varieties and many commercial snap bean varieties are susceptible to heat stress related yield losses due to reduced pollen production when nighttime temperatures are high before and during flowering. This is why bean crops are planted in certain periods to avoid pollination related losses (snap beans planted for spring and fall crops but avoiding summer crops, lima beans planted in June and early July for fall harvest).

Dr. Johnson is the Extension Vegetable & Fruit Specialist at the Univ. of Delaware. From the ***Weekly Crop Update,*** *Vol. 23, Issue 19, July 31, 2015.*

Recommendations for Blueberry Establishment

Lee Stivers

For a crop that may fruit for fifty years under the right care, it is critical to get blueberry plants off to a strong, healthy start.

Let new blueberry plants grow for two or even three years before allowing them to set fruit.

In response to strong market demand for fresh, local blueberries, many growers in Pennsylvania, both established and beginning farmers, are putting in new plantings of this crop.

Blueberries have a lot going for them as a new or expanding crop:

strong sales
few pests
ease of management
long picking season
good shelf life (at least for a berry!)

However, in the haste to reap these benefits, growers may be tempted to cut some corners in those first few years of establishing a blueberry planting.

Follow these crop establishment recommendations—all of them!—to get the most out of your crop over time. Full details can be found in the Mid-Atlantic Berry Guide for Commercial Growers.

Site selection - Choose a site that is protected from late frosts, as these can injure flowers and young berries. Lighter-textured soils that are well drained but not droughty; high in organic matter; low in pH; and low in calcium are highly preferred.

Managing pH and organic matter - Begin soil testing and soil preparation one to two years before planting. Few areas in Pennsylvania can support blueberries without considerable soil amending prior to planting. Almost always, sulfur will need to be applied to lower pH to the optimum range of 4.5 to 5.0. It takes time—at least one full growing season—for sulfur to react in soils to start lowering pH. Organic matter additions are also beneficial, especially in our heavier soils.

Planting - Blueberries are typically planted in the spring as soon as soil can be worked. Add a gallon of some type of composted organic matter or peat to the planting hole, but avoid mushroom compost due to its high pH. Water immediately. Newly set plants should show a flush of growth about two weeks later; once they do, make an application of ammonium sulfate at the rate of 48 lbs ammonium sulfate per acre. On a per-plant basis, at a standard spacing of 5' x 9', this works out to only 1.5 tablespoons of ammonium sulfate per plant. The fertilizer should be applied in a band around the plants, staying about six inches away from the stems. Be careful not to over-apply, as blueberry roots are easily burned by excess fertilizer. Mulch plants well with rotted sawdust, bark mulch, or chopped corncobs.

Pruning flowers - Flower buds should be rubbed off of blueberry plants immediately after planting them in the establishment year. Now, here comes the hard part. The Mid-Atlantic Berry Guide for Commercial Growers states:

...also, completely remove the flowers from plants during their second year so plants become well-established. Sacrificing this small amount of fruit is well worth the dividend of

(continued on page 26)

BERRY PRODUCTION

Blueberry Fruit Rots

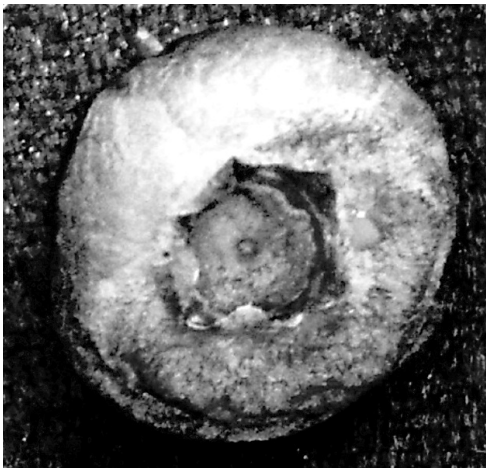
Cassandra Swett

Anthracnose (also called ripe rot) in blueberry, has been quite severe this year, especially in highly susceptible varieties such as Bluecrop, Bluetta, and Blueray.

Anthracnose in blueberry is caused by Colletotrichum species, the very same troublesome fungi that also cause anthracnose fruit rot in strawberry and peach, bitter rot in apples and ripe rot in grapes.

Anthracnose is diagnosed by the sunken black lesions on the fruit, with little black dots

In blueberries, the fungus overwinters in twigs, buds and old fruit spurs that became infected last year. Spores infect flowers and ripe green fruit, so it's important to protect from bloom through the green fruit stage. These infections don't show symptoms until the fruit ripens or after harvest. The fungus also infects shoots and twigs and here you have the source of your inoculum for next year. These infections may cause lesions on the shoots, but infected wood and buds can also appear healthy.



If you put infected blueberries in a bag for a day, Anthracnose will make lots of orange gooey spore masses. If it has rained recently, the orange goo (the technical name) forms on the berries in the field.

In severely infected fields, you can prune out old and dead wood in the fall. Heavy pruning to open the canopy can both reduce humidity and improve spray coverage. Fungicides should be applied from pink bud to green fruit, and if you have high disease levels, continue to spray through harvest. The most effective fungicides include Switch, Abound, Pristine, Captan, Ziram, Omega 500, and Quash 50.

For an excellent integrated pest management guide for blueberries, see the 2013 Southeast Regional Blueberry Integrated Management Guide.

As we have discussed in previous articles this season, Anthracnose infection is weather dependent. Infection periods happen when we have at least 12 hours leaf wetness above 65° F. The weather stations in western Maryland and the eastern shore indicate that June had weekly infection events. So if you did not have full coverage through June, you may start seeing severe rot developing.

In Michigan, weather station data is used to evaluate risk of anthracnose for blueberries, to help growers decide whether they need to spray. We are testing to see whether diversified growers can use the same weather model to make decisions for Colletotrichum management in strawberries, blueberries, apples, peaches and grapes. This type of program not only lets you know when it's important to protect, but can also help reduce the risk of fungicide resistance development and may be useful in reducing potential negative effects of fungicides on honeybee health.

For continued updates on fruit diseases through the growing season and links to resources, visit Dr. Cassandra Swett and Dr. Kari Peter on Twitter.

*Dr. Swett is the Grape and Small Fruit Pathologist at the Univ. of Maryland. From the **Vegetable, Small Fruit, and Mushroom Production News,** Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news/2015, July 12, 2015.*

Recommendations... *(continued from page 25)*

establishing a planting that will fruit for 50 years or more if well-maintained. Some of the crop should also be removed the third year, again encouraging sound establishment.

I have seen several second-year blueberry plantings lately that were not flower-pruned. Stunted but covered with berries, they struggle to produce enough leafy growth to support their heavy fruit load. This imbalance will likely set the crop back for several years.

Irrigation - Blueberry roots do not grow very deeply in the soil, and therefore they are very susceptible to drought stress, especially during establishment years. Drip or overhead irrigation should be used to provide at least an inch of water per week during rain-free periods.

Conclusion - Blueberries are long-lived plants. It is worthwhile to take the time during establishment to make sure that all plant needs are being met.

*Ms. Stivers is with Penn State Extension in Washington Co. From the **Vegetable, Small Fruit, and Mushroom Production News,** Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news/2015, June 24, 2015.*

Phytophthora Fruit... *(continued from page 23)*

spread during shipment. Revus and Presidio also performed well when applied four days before harvest in reducing post-harvest rot.

Watermelon fruit are susceptible to Phytophthora fruit rot at all growth stages. Therefore sprays targeted for Phytophthora fruit rot should begin when fruit are approximately grapefruit size.

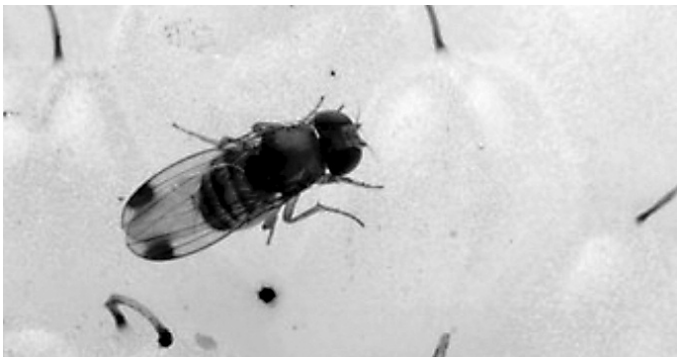
Another question to consider before deciding whether to aggressively manage a Phytophthora fruit rot epidemic is how effective the best management program will be. In the same trials mentioned above, the best treatments, sprayed weekly for four or five weeks, reduced fruit rot between 60 to 75% over the nontreated plots. Therefore even in treated fields many fruit won't be harvestable.

*Dr. Everts is the Vegetable Pathologist at the Univ. of Delaware and the Univ. of Maryland. From the **Weekly Crop Update,** Univ. of Delaware Extension, Vol. 23, Issue 15, July 3, 2015.*

Spotted Wing Drosophila Update

Kathleen Demchak and David Biddinger

As of July 30, spotted wing drosophila is being consistently found in low numbers in various locations across the northeast, so growers of susceptible berry or other fruit crops should be monitoring for this pest, and be prepared to take steps for management.



Spotted wing drosophila male. Photo: Alex Surcica

In Pennsylvania, SWD has been found in Adams County on cherries and in Erie County on various fruit crops. We have yet to catch any in traps on our research farm in Centre County, but we expect we will be finding it shortly. Growers should review the following articles on SWD monitoring:

Spotted Wing Drosophila Fruit Monitoring

Spotted Wing Drosophila Management

Spotted Wing Drosophila, Part 1: Overview and Identification

Spotted Wing Drosophila, Part 2: Natural History

Spotted Wing Drosophila, Part 3: Monitoring

Spotted Wing Drosophila, Part 4: Management

Links to these articles are found at http://extension.psu.edu/plants/vegetable-fruit/news/2015/spotted-wing-drosophila-update-july-30-2015.

*Ms. Demchak and Dr. Biddinger are with Penn State Univ. From the **Vegetable, Small Fruit, and Mushroom Production News,** Penn State Extension, extension.psu.edu/plants/vegetable-fruit/news/2015, July 30, 2015.*

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