PENNSYLVANIA
VEGETABLE GROWERS

NEWS

August 2018 / Volume 41 Number 8

for the commercial vegetable, potato and berry grower

Governor Recognizes Impact of Local, Healthy Foods During Produce Month

Secretary of Agriculture Russell Redding (second from the right) presented Governor Wolf's Produce Month proclamation to (left to right) Steve Linvill, Norm Shultz and Sue Linvill Jochum of Linvilla Orchards in Media, PA. Also present was Bill Troxell from the Vegetable Marketing and Research Program.

Pennsylvania is home to more than 1,000 farmers' markets, with local, nutritious, and affordable produce generating more than $140 million for the commonwealth's economy. On August 2, in recognition of those significant contributions, Agriculture Secretary Russell Redding announced that Governor Tom Wolf has declared August 2018 as Produce Month in Pennsylvania.

"The commonwealth is a leader in the production of fruits and vegetables, and the impact these products have on our communities is far-reaching and profound," said Sec. Redding. "We continue to support the growth and consumption of Pennsylvania produce, and we continue to encourage Pennsylvanians to eat fresh, eat healthy, and buy local—three of the most important things a consumer can do for themselves and for their community."

During his visit to Linvilla Orchards in Delaware County, Sec. Redding noted that Pennsylvania farmers' markets offer a variety of benefits to local economies. For instance, he said, every $100 spent at a farmers' market contributes $48 to the local economy.

In addition to the economic impacts realized through the consumption of local produce, Redding also noted that farmers' markets can help combat food insecurity by providing affordable, or even free, food to Pennsylvanians at risk for hunger.

He reminded eligible residents that they can access fresh, Pennsylvania-grown produce – at no cost — through the Women Infants and Children (WIC) and Senior Farmers Market Nutrition Programs.

Text of the governor's proclamation follows:

PENNSYLVANIA PRODUCE MONTH
August 2018

WHEREAS, Pennsylvania is a national leader in the production of quality, nutritious and affordable vegetables, a sector of the agriculture industry that generates more than $140 million for the Commonwealth's economy; and

WHEREAS, nearly 4,000 farm families manage about 49,400 acres which produce well in excess of 200,000 tons of vegetables for fresh and processing use each year; and

WHEREAS, Pennsylvania's vegetable growers are national leaders in the production of processing snap beans (3rd); pumpkins (7th), cantaloupes (7th), fresh market sweet corn (9th), fresh market tomatoes (11th) and fresh market cabbage (12h); and

WHEREAS, Pennsylvania growers use integrated pest management and other good agricultural practices to provide an extra level of safety to consumers and the environment alike; and

WHEREAS, Pennsylvania vegetables are both delicious and nutritious, providing important vitamins, fiber and other dietary components that are essential to a healthy, balanced diet; and

WHEREAS, health authorities have long encouraged increased consumption of vegetables for both nutritional and disease prevention purposes; and

WHEREAS, many Pennsylvania fruit and vegetable growers market their produce as PA Preferred™, the official brand of agricultural goods grown and made in Pennsylvania. Buying PA Preferred ensures consumers have chosen food locally grown and processed and are investing their dollars back into the local economy by supporting Pennsylvania's producers; and

WHEREAS, fresh Pennsylvania vegetables are available in abundant supply and peak quality at community farmers markets, roadside farm markets, and supermarkets throughout the Commonwealth during August.

THEREFORE, in recognition of our thriving vegetable

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NEWS

Penn State Extension Helps Growers Comply with FSMA Regulations

Photo credit – Penn State Extension

Educators are available to consult with growers on their farm operations at no-cost to the grower and help them to see how close they are to meeting the new regulatory requirements.

On-Farm Readiness Reviews are a no-cost opportunity for produce growers to have their preharvest, harvest and postharvest conditions and practices evaluated, assess what they are doing well, and identify areas for improvement in food safety practices on their farms. The On-Farm Readiness Review is not an audit, inspection, or any type of regulatory assessment. Reviewers will simply go to the farms that request a review and help the grower prepare for an actual FSMA Produce Safety Ruleinspection once compliance dates are reached.

Thirty On-Farm Readiness Reviews have been completed this year, and sixty more have been scheduled.

For more details on this cost-free program visit:

https://news.psu.edu/story/530666/2018/08/09/impact/penn-state-extension-help-farm-readiness-reviews-produce-growers or contact Jeff Stoltzfus, statewide good agricultural practices extension educator and FSMA produce safety lead trainer at 717-394-6851 or jhs3@psu.edu.

In Memory

J. Robert Keller

J. Robert "Bob" Keller, 65, of Lititz went home to be with his Lord on Friday, August 3, 2018 at Hershey Medical Center. He was born in Lancaster, the son of Lloyd and Eunice Martin Keller of Lititz. He and his wife, Lois K. Harnly Keller, would have celebrated their 46th wedding anniversary later in August. A 1971 graduate of Lancaster Mennonite High School, Bob was lifelong farmer. He operated Penn Valley Farms in Penn Township and, with his son, also operated Aeromaster Compost business. He and his family have been regular volunteers at the PVGA Farm Show food booth for many years.

Bob spent 33 years as a pastor and was passionate about serving the Lord as a shepherd. In 2015, he began serving as a radio Bible teacher for Sunday School Meditations.

Surviving in addition to his wife and parents are five children, Karen (James) Kauffman of Reedsville, Cynthia (James) Kilmer of Myerstown, Sheri (Ryan) Laughman of Denver, Stephanie Keller of Lititz and Jonathan (Kristin) Keller of Manheim, nine grandchildren, and six siblings. He was preceded in death by a son, Daryl Keller.

Memorial contributions may be made to: Ark Encounter, 1 Ark Encounter Drive, Williamstown, KY 41097 or Sunday School Meditations, P.O. Box 1031, Lancaster, PA 17608. To send the family on-line condolences, please visit: www.BuchFuneral.com

Information from lancasteronline.com.

Governor Recognizes... *(continued from page 1)*

industry, I, Tom Wolf, Governor of the Commonwealth of Pennsylvania, do hereby proclaim August 2018 PRODUCE MONTH in Pennsylvania, and encourage all citizens to enjoy the commonwealth's plentiful supply of fresh and processed vegetables and vegetable products while recognizing the industry's contributions to our economy and health.

GIVEN under my hand and the Seal of the Governor, at the City of Harrisburg, this first day of August two thousand eighteen, the year of the commonwealth the two hundred forty-third.

TOM WOLF

*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.

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Five On-Farm Videos Offer an Inside Look at Pennsylvania Farms

There are many working parts to the local food system from start to finish. The amount of steps and people involved from seed to table is quite astonishing. No matter how far the chain stretches, be it to canned tomatoes in your local supermarket or a carrot bought directly from the farmer and enjoyed raw before returning home from a local stand or market, there is one very important piece to the puzzle - the farmer.

To celebrate PA Produce Month and pay tribute to the hard-working catalysts of the local food system, PA Veggies (the Pennsylvania Vegetable Marketing and Research Program's website) is sharing five videos that take viewers to Pennsylvania farms, face to face with the farmers, as they share their knowledge and experiences. The videos cover a diverse area geographically and thematically, exploring everything from the life cycle of tomatoes and sweet corn, to high tunnels, community supported agriculture (CSA), and farm stand logistics. The lineup includes:

Seed to Table: Tomatoes with Kaitlin Horst, Cedar Meadow Farm

Pennsylvania is a goldmine of beautiful, delicious, juicy tomatoes of all varieties, especially through August / PA Produce Month. But how does that wholesome tomato end up in the store or at the market and then on your table? There are many steps involved and actions taken daily to assure safe and quality delivery. Take a look!

The Ins and Outs of High Tunnels with Peter Flynn, Pete's Produce Farm

The average consumer may observe covered structures on a Pennsylvania farm and conclude that it's a greenhouse but, the truth is, a majority of them are high tunnels. These mistaken structures have a huge impact on Pennsylvania's local food system and are a key factor in making farm fresh veggies more accessible for you. Take a moment and find out how it all works.

How a Pennsylvania Farm Stand Works with Art King, Harvest Valley Farms

When it comes to local Pennsylvania produce, it doesn't get much better than a farm stand. These operations are run in conjunction with a local farm, allowing vegetables to reach the consumer directly in a short amount of time. They offer incredible quality, nutrients and flavor! But what happens behind the scenes to make this all happen? And what's the future look like for farm stands? Your farmer has the answers.

Behind the Scenes on CSA Day with Dave Miller, Miller Plant Farm

The consumer's' role in a community supported agriculture program (CSA) involves just a few steps - sign up, arrive at a particular location at a particular time, leave with fresh vegetables directly from the farmer. However, there is a lot that happens behind the scenes to make that service possible. If you're going to take a glimpse into that world, why not do it from the perspective of a farmer managing a multi-faceted operation and a 500 person CSA?

Seed to Table: Sweet Corn with Brian Campbell, Brian Campbell Farms

No Pennsylvania summer is complete without fresh, juicy sweet corn. When the timing is right, you'll find it everywhere, from roadside stands to supermarkets, which is why it seemed best to get the sweet corn from a Pennsylvania farmer who produces for both outlets, and has been in the farming business since the young age of 14. We love sweet corn, but how often do we think about the seed to table process? The insider facts may surprise you!

These videos are intended to allow consumers to meet the farmers behind their food. They are being introduced at the end of August to remind consumers that local vegetables are available in Pennsylvania well through August. In fact, fall brings new flavors to the table and many autumn vegetables are suitable for preserving, canning, soup-making, storage, and more. It's the perfect time to connect with their local vegetable providers to glean recipes, tips, and suggestions and, whenever they're unable to connect directly with their farmer, remember to visit PAVeggies.org and join the #paveggies conversation on social media.

The Vegetable Marketing and Research Program website also has other consumer-oriented videos that are available for growers to download and play in their markets.

National News Briefs

Congress Needs to Hear from Farmers on Agricultural Labor Reform

There's an opportunity for meaningful agricultural labor reform to be passed this year. But for the measure to move forward, members of Congress need to know how critical such reforms are to the agricultural community. Leaders in Congress are considering holding a vote in September on the AG and Legal Workforce Act, which would create a new, year-round agricultural guest worker program. The proposal, sponsored by Rep. Bob Goodlatte (R-Va.) and supported by Farm Bureau, comes as many agricultural producers face a labor shortage, threatening their competitiveness with foreign farms, and crops have gone to waste due to delays in processing visas for guest workers under the current H-2A program. In addition, two key segments of Pennsylvania agriculture-dairy and mushrooms-have not been able to take advantage of the H-2A program because they have year-round, rather than seasonal, labor needs. U.S. House Speaker Paul Ryan has said he will schedule a vote on the bill, but only if enough members of Congress show their support. If this bill fails, the likelihood of ag labor and immigration reform in the next few years is bleak. Please contact your representative that reforming agricultural labor is a key priority for Pennsylvania's leading industry. If you need contact information for your Congressman, call PVGA at 717-694-3596.

*From **Farm Bureau Express**, Penna. Farm Bureau, August 24, 2018.*

House and Senate to Meet on Farm Bill

Congress is a step closer to putting the 2018 Farm Bill to a final vote.

The Senate voted recently to appoint conferees who will

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State News Briefs

Tanner Delvalle Wins Extension Award

Tanner Delvalle, a Commercial Horticulture Extension Educator for Penn State Extension, was awarded the 2018 Achievement Award from the National Association of County Agriculture Agents during their recent conference in Chattanooga, Tennessee

The award recognizes agents/educators with 10 years or less of service in extension work who have shown excellence in their extension work. Only two percent of Penn State Extension educators receive this award each year.

Delvalle primarily covers Berks and Schuylkill Counties across horticultural commodities including turf, ornamentals, right-of-ways, small fruit, vegetables, Christmas trees, and hops. Tanner also conducts research on hops production at a research hopyard in State College. In addition to horticultural programming, Tanner is a certified remote pilot for small unmanned aircraft systems (sUAS), and provides on-farm demonstrations and presentations for clients interested in sUAS.

Spotted Lanternfly Permit Training Available

Training is available online to obtain the necessary permits to comply with Pennsylvania Department of Agriculture's spotted lanternfly quarantine.

Businesses, including farms, must obtain spotted lanternfly permits if they are performing work within or moving goods out of the quarantine zone, which includes Lancaster, Lebanon, Schuylkill, Berks, Chester, Carbon, Monroe, Lehigh, Northampton, Montgomery, Bucks, Delaware and Philadelphia counties. Under the quarantine order, each business must designate at least one spotted lanternfly trainer who must go through training and pass an exam. That person is then responsible for training other employees and keeping records to comply with the regulation.

Training and the exam are available online at http://bit.ly/2A69fdn. Several in-person training sessions are also being planned within the quarantine area. For more information or to register, contact Jeff Miller at 717-772-5206 or jefamiller@pa.gov.

The quarantine is among the efforts aiming to halt the spread of the invasive spotted lanternfly, which threatens many agricultural crops, including fruit trees, grapes and hardwoods.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Finding a Vaccine for Lyme Disease

Katie McLaughlin has grown up watching the impact of Lyme Disease on each member of her immediate family and herself.

"While I remember my own pain and fatigue, none of that will ever compare to the constant fear of losing my dad (Steve McLaughlin)," the Juniata County resident recalled. "The disease nearly took my father's life. After three years of treatment throughout Pennsylvania, New York and New Jersey, my father was left with serious nerve damage that led to two nervous system surgeries, one of which causing a blood clot resulting in an additional open-heart surgery."

Pennsylvania leads the nation in Lyme Disease cases and farmers and rural residents are at greater risk due to the amount

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National News Briefs *(continued from page 3)*

help develop the final draft of the critical agriculture legislation. The House took similar action last month. Conferees from each chamber will now meet to work out differences between separate versions of the farm bill passed by the House and Senate and prepare a combined bill that will require approval from each chamber.

Having a new farm bill in place before the current law expires at the end of September is critical to continuing key agriculture programs that help farmers manage their risk to stay viable in an unpredictable business and give certainty during a struggling farm economy. Some hurdles remain, chiefly reconciling differences between the House's and Senate's approaches to the nutrition title and conservation programs.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

WOTUS Takes Effect in Pa. but Enforcement Uncertain

A recent court ruling has caused the controversial Waters of the U.S. rule to technically take effect in Pennsylvania and 25 other states. However, it's unclear what the ruling will mean for the federal Environmental Protection Agency's potential enforcement of the regulation, given that the agency is in the process of repealing and rewriting the rule. "To avoid widespread uncertainty and potential enforcement against ordinary farming activities in these already-uncertain times, we call on the administration to take immediate steps to limit the impact of this dangerous court decision," American Farm Bureau Federation President Zippy Duvall said. The federal district court ruling in South Carolina found that EPA did not follow proper procedures earlier this year when it issued a rule delaying the implementation of WOTUS in an effort to stop the 2015 regulation from taking effect while it developed a replacement. Farm Bureau and other groups have asked that court to delay the order (thus stopping the rule from taking effect) while they appeal the decision. At the same time, Farm Bureau is asking a federal district court in Texas to block implementation of WOTUS nationwide. The current version of WOTUS would subject an estimated 98 percent of Pennsylvania land to federal water regulations. Farm Bureau believes the 2015 rule attempts to regulate land areas well beyond what is allowed by federal law and has advocated for replacing it with one that protects water quality without trampling on landowners' rights.

*From **Farm Bureau Express**, Penna. Farm Bureau, August 24, 2018.*

Wheeler Nominated as EPA Chief

President Donald Trump has nominated Andrew Wheeler to lead the U.S. Environmental Protection Agency following the resignation of former EPA Administrator Scott Pruitt.

Wheeler, who was confirmed as the agency's deputy administrator in April, must be confirmed to the post by the Senate. He will serve as acting EPA administrator in the interim.

Wheeler began his career at the EPA as a special assistant during President George H.W. Bush's administration. He served as a staffer for Sen. Jim Inhofe of Oklahoma and in several staff leadership roles for the Senate Committee on Environment and Public Works. Prior to returning to EPA recently, Wheeler worked as an attorney and lobbyist specializing in the energy and natural resources industry.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

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of time they spend outside. But there could be hope for McLaughlin and thousands of other Pennsylvanians who have struggled with the disease. A new Lyme Disease vaccine, VLA15-101, recently passed phase one of three in Federal Drug Administration testing.

Pennsylvania has prime conditions for Lyme Disease to spread, due to the state's ideal environment and large concentrations of the black-legged tick's primary vector, the white-tailed deer, which can carry 3,000 ticks each. According to available Centers for Disease Control data, the state saw 48,626 confirmed cases of Lyme Disease between 2006 and 2016. And the number of cases in the state increased 44 percent between 1999 and 2015.

In Pennsylvania, of the 1,005 ticks submitted to the Laboratory of Medical Zoology, 268 ticks (26.67 percent) tested positive for Borrelia, which causes Lyme Disease. This means that one in four deer ticks can cause Lyme Disease.

In 1998, LYMErix was approved by the FDA to be safe and effective in preventing the contraction of Lyme Disease in humans. The vaccines were administered in a series of three steps and worked by killing the Borrelia within the tick's midgut upon feeding from individuals with vaccine-induced antibodies.

The series of LYMErix vaccinations failed to receive public acceptance and were voluntarily pulled from the market in 2002 due to poor sales. The failure may have occurred for several reasons: negative news coverage surrounded the potential of arthritic-like side effects, the recommended booster time frame was unclear, and a pediatric version of the vaccine was not offered.

Medical costs related to treatment for Lyme Disease range from $712 million to $1.3 billion annually in the U.S., prompting a new demand for a solution since the failure of LYMErix.

McLaughlin is hopeful of the new vaccine's ability to prevent the contraction of Lyme Disease.

"I do believe that research and human health standards are needed when testing this vaccine because no one facing Lyme Disease deserves false hope," she said. "So we need to get this vaccine right."

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Conservation Grants Available for Farms, Small Businesses

Pennsylvania farms with 100 full-time-equivalent employees or fewer can apply for grants to help pay for natural resource conservation projects. Pennsylvania Department of Environmental Protection's Small Business Advantage grant program will match up to 50 percent of the cost of materials for projects such as planting riparian buffers, installing streambank exclusionary fencing and implementing barnyard runoff control systems.

There is $1 million is available for grants this year. Producers should apply right away because grants are awarded on a first-come, first-served basis and funds are usually gone within three months. For more information, visit the Small Business Advantage Grant page at www.dep.pa.gov or contact the DEP Small Business Ombudsman Office at 717-772-5160.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Application Period for Resource Enhancement and Protection Program (REAP) Begins

REAP provides tax credits to farmers, landowners, and businesses for implementing practices which increase efficiency while protecting natural resources. REAP is a first-come, first-serve program. For details, call 717-705-4032 or visit: https://www.agriculture.pa.gov/Plants_Land_Water/StateConservationCommission/REAP/Pages/default.aspx

*From the **AG ONE Newsletter**, Penna. State Council of Farm Organizations, Issue 2018.12, August 6, 2018.*

- Food Safety Compliance: The PA Department of Agriculture is offering free on-farm readiness reviews to informally review areas of compliance with the Food Safety Modernization Act (FSMA). FSMA Rules apply to farmers with produce operations above a certain threshold. Details: 717-787-4315

Free Legal Services for Farmers Available Through Penn State Law

Penn State Law is offering farmers the opportunity to obtain free legal services through its Rural Economic Development Clinic. The program gives law students a chance to gain practical legal experience working with clients under the supervision of faculty and licensed attorneys. Through the clinic, student attorneys can work with clients to review or prepare legal documents, conduct research and provide advice. Students attorneys have helped clients with topics such as renting farmland and facilities, CSA membership agreements, farmers market rules, liability waivers and purchasing or establishing a business. Student attorneys cannot represent clients in litigation matters through the program. Applications are now being accepted for work to be done during the fall 2018 semester. Clients will be selected on a first-come, first-served basis and should be able to travel to State College for client meetings. To apply or learn more, email Ross Pifer with a detailed explanation and background of the legal issue to be addressed at rpifer@psu.edu or call 814.865.3723.

*From **Farm Bureau Express**, Penna. Farm Bureau, August 24, 2018.*

Flushing Spray Tanks Between Spray Applications May Be Minimized by Direct Injection

Spray tanks may need to be flushed up to several times a day when different types of pesticides are applied to different crops. The process of direct injection may offer relief from numerous times required for rinsing, mixing and refilling the spray tank by injecting pure chemical into water at a site away from the main spray tank.

This means only water is needed in the spray tank eliminating the need to rinse tank residues numerous times throughout the day. There is no left-over product that will need to be needlessly sprayed on a field or disposed of in some other manner. Substantial time is saved using the direct injection system. The direct injection technology is readily available from multiple manufacturers.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Roundtable Talk Focuses on Rural Broadband

Pennsylvania Farm Bureau was one of several organizations that discussed the lack of internet connectivity at a roundtable discussion hosted by U.S. Rep. Tom Marino.

Marino, who represents several counties in the central and northern Pennsylvania, said the lack of internet connectivity is one of the chief issues he hears about from constituents. He plans on making the issue of improving broadband connectivity one of his chief legislative initiatives.

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"I don't want to leave here just saying this was a nice meeting. I want some thoughts and ideas of what we can do to facilitate this," Marino said.

PFB Vice President Chris Hoffman, who lives in Juniata County and participated in the discussion, said the lack of reliable internet service in his area means he cannot use the latest technology on his hog and chicken farm. That type of technological advancement is occurring throughout agriculture, but without broadband services, farmers are unable to take advantage, Hoffman said.

Mark Smith, Pennsylvanian's executive director of broadband initiatives, said Pennsylvania is making mapping existing utility rights-of-way a priority as it seeks to connect most of rural Pennsylvania to the internet by 2022. In addition, the state is performing a cost analysis of what it would cost to deliver high speed services to those areas, he said.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Grants Available to Help Cover Costs Associated with Manure Injection

A multi-year grant has been made available through the National Fish and Wildlife Foundation that will cover the cost difference between injecting and surface application of manure.

Injecting manure carries a slightly higher cost of application compared to broadcasting but offers the benefit of minimizing runoff of nutrients from the field by placing nutrients near the root zone of the crop.

Details about the grant from NFWF are available from Penn State Extension by contacting Leon Ressler at ljr6@psu.edu or Ron Hoover at rjh7@psu.edu.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Invasive Tick a Potential Threat to Livestock, People

The Asian "longhorn" tick, an invasive species that congregates in large numbers and can cause anemia in livestock, has been found in Pennsylvania.

The insect was recently discovered on a wild deer in Centre County and was found last year on sheep in New Jersey. While the insect carries several diseases that infect hogs and cattle in Asia, none of the samples inspected so far in the U.S. were found to be carrying infectious pathogens. However, state officials warn that the tick still poses a health threat to people and animals. The insects can spread quickly and a single tick can produce 2,000 eggs after feeding on a host.

"Even experts have difficulty distinguishing among tick species, so it is important to take precautions to protect pets, livestock and family members from becoming a host for ticks of any kind," said State Veterinarian Dr. David Wolfgang. "Scientists don't yet know how this species will adapt to the North American climate and animal hosts, but we know it survived New Jersey's winter and has infested sheep and cattle in this region."

Wolfgang recommended examining livestock for ticks regularly and working with a veterinarian to develop tick prevention and control measures. Farmers can reduce tick habitat by keeping grass low and maintaining a nine-foot distance between pastures and wooded areas.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Pa. Organizations Receive Farm Rescue Equipment from Nationwide

Two Pennsylvania rescue organizations will be better equipped to come to the aid of farmers trapped in grain bins thanks to Nationwide Insurance.

The Beaver County Technical Farm Rescue Team and Star Hose Fire Company No. 1 in McKean County were among 29 winners nationally of Nationwide's Nominate Your Fire Department Contest. The program, held in conjunction with Grain Bin Safety Week, provides fire companies with the specialized equipment (a grain bin rescue tube) and training needed to safely perform grain bin rescues.

This year's recipients were announced just a month after a grain bin rescue in Northumberland County highlighted the importance of such training.

Firefighters used the skills they learned during a session conducted by Penn State's Ag Rescue Training Program to save the life of a farmer who was trapped in a grain bin. The Penn State training was prompted by nearby Carsonville Fire Company in Dauphin County receiving a grain bin rescue tube through the Nationwide contest in 2016.

"There were several responders on scene who said that the training came back to them that day," said David Faust, chief for Fisherville Fire Company, one of the responding departments. "As a responder and an instructor for the (grain bin rescue) classes, I feel that this training is very important, as these incidents are not common and most rescue techniques that are commonly used may not work in farm-rescue situations."

Over the last 50 years, more than 900 cases of grain entrapments have been reported in the U.S. and 62 percent of them have been fatal.

Nationwide's program aims to expand the number of rural fire companies that have that equipment and training, as local rescue organizations are often the only line of defense in cases of grain bin entrapments. Since 2014, Nationwide's contest has awarded rescue tubes and training to 77 fire departments in 23 states.

"This year, I'm happy to announce that we'll be supplying rescue tubes to more fire departments than ever before," said Brad Liggett, president of Nationwide Agribusiness. "Grain bin entrapments can devastate a family in a matter of seconds and we hope that this effort will help save lives that would otherwise be lost. Until we can convince all farmers to develop a zero-entry mentality, we will continue to make rescue resources as widely available as possible."

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

Two New Game Commissioners Selected

Two new members have been appointed to fill vacancies on the Pennsylvania Game Commission. Each will serve a four-year term.

Scott H. Foradora, of Clearfield County was selected from Region 3, which includes Cameron, Centre, Clearfield, Clinton, Elk, Jefferson, McKean and Potter counties. He owns an insurance business.

Dennis R. Fredericks, of Washington County, was selected from Region 2, which includes Allegheny, Armstrong, Beaver, Fayette, Greene, Indiana, Washington and Westmoreland counties. A retired environmental engineer, he previously served on the commission from 1991 to 1999.

Both men are lifelong hunters and members of several sportsmen's organizations.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

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Spotted Lanternfly Coalition Provides Updates

Robert Cochran

Pennsylvania's Spotted Lanternfly Coalition, consisting of the Pennsylvania Department of Agriculture (PDA), the United States Department of Agriculture (USDA) and the Pennsylvania State University (PSU), provided an update regarding the spotted lanternfly, an invasive species infested in Southeastern counties.

"*The spotted lanternfly is an invasive pest and it is invasive in every way,"* said Secretary of PA Department of Agriculture Russell Redding. Sec. Redding indicated the pest is native to Southeast Asia but Pennsylvania is ground zero in the United States for the species which was first discovered in Berks County four years ago and spread to twelve other counties in the Commonwealth.

Sec. Redding said the concerns about the spotted lanternfly are economic, social and environmental and today's update is to discuss containment and control of the species. Sec. Redding said the update is timely because spotted lanternflies are beginning to enter the adult phase of their lifecycle around this time of year, causing an increase of calls to the pest's survey hotline.

Surrounding states share the concerns regarding the spotted lanternfly, Sec. Redding said, adding the coalition hopes to control the species to this region. Sec. Redding said awareness of the public is important and the business community's actions are critical. Sec. Redding said the coalition is working to spread awareness of the spotted Lanternfly and, in regards to containing the pest, described the coalition as "the boots on the ground" in the Commonwealth. Sec. Redding stated the 2018-2019 fiscal budget secured $3 million to combat the species and USDA provided $17.5 million in funding. "*We are positioned well to keep fighting this battle*," Sec. Redding said.

The Secretary said funding is invested in public awareness, suppression and treatment, and research to monitor to the spotted lanternfly across all Pennsylvania counties. Sec. Redding said significant steps have been taken to combat the species but more needs to be done. Sec. Redding said those living or working in spotted lanternfly quarantine zone should review the Commonwealth's checklist to ensure they do not escape their region.

Sec. Redding said those with concerns should contact the survey hotline, 1-888-4BAD-FLY. According to Sec. Redding, businesses operating or moving within the quarantine zone must have the spotted lanternfly permit to prevent the spread of the species outside the thirteen counties. Sec. Redding said New Jersey has three counties with the spotted lanternfly and New York is deeply concerned about the species as well.

"The Commonwealth is leading by example and is taking the important step of permitting of state vehicles," Sec. Redding stated, adding several agencies have taken the permitting test online and are training employees on precautions when traveling into the quarantine zone. Sec. Redding said the permit test is available on the Department's website. "*We believe only by working together can we control this pest.*

"The level of cooperation between federal, state and extension have been a great success," said Timothy Newcamp, State

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Spotted Lanternfly... *(continued from page 9)*

Plant Health Director for Pennsylvania with USDA. Newcamp said he has been amazed by the professionalism and dedication on combating the spotted lanternfly. Newcamp indicated, since February, USDA opened four field offices in Pennsylvania with 35 staff members. He stated the offices are located in Easton, Lancaster, Glenside and Meyersville, and when fully staffed, 96 people will be available to combat the pest. *"Our offices are located at the very perimeter of the infestation…in hopes of containing the population from further spread,"* Newcamp said. *"Control teams and survey folks are working the 18-mile buffer surrounding the known infestation*," he added, saying the buffer is to compliment PDA and their main infestation area, known as the core. Newcamp said USDA scientists are studying biocontrol, pesticides and trap-and-lure development to understand different options in handling the spotted lanternfly. "*This research, matched along with our cooperators, will not only help battle the pest, but also to shape direction of the spotted lanternfly program*." Newcamp stated. "*We are also working closely with our partners on collaborating on outreach, ensuring a consistent message and sharing of resources."*

Newcamp claimed an area-wide program was launched in spring to suppress further spread of the spotted lanternfly. Newcamp also claimed the main operation goal this season is to preserve properties which were treated with pesticides last year and to include more potentially containment regions this year and will continue into mid-September. According to Newcamp, since April, USDA established over 8,000 survey points and treated fifteen properties, totaling over 1,900 acres, for spotted lanternflies. "*The treatment entails reducing the spotted lanternfly's preferred host, Ailanthus Tree, which is an invasive pest also known as the Tree of Heaven*," Newcamp said. He claimed 49 properties are scheduled for treatment in the near future.

"Early detection is critical to prevent further economical and ecological losses," Newcamp said, adding USDA is supporting the PDA's statewide survey with $1.9 million. *"The survey will help demonstrate pest-free areas, help facilitate trade of Pennsylvania products [and] help with the homeowners and businesses out there to look for and report signs of the spotted lanternfly*."

Dr. Dennis Calvin, Associate Dean of PSU's College of Agricultural Sciences, said the coalition is a unique partnership between government and academic resources. He stated one of PSU's roles is to work with counties and industries affected by the spotted lanternfly. Dr. Calvin said the three organizations have historically worked extremely well together, citing the eradication of Plum Pox as evidence. Dr. Calvin said the College of Agricultural Science has a long-standing relationship with PDA and USDA in outreach and research. According to Dr. Calvin, the spotted lanternfly is difficult to deal with because they are new species to the region, limiting prior research and management strategies.

Dr. Calvin said there is no single remedy for combating invasive species and managing the pest is dependent on continuing research. He commented no single agency could combat the species and residents of the commonwealth are needed in managing the further spread effectively. Dr. Calvin said homeowners can do the following in maintaining the spotted lanternfly:

- Visit PSU's spotted lanternfly website because it is the primary source for information concerning the species.
- *When living or visiting the quarantine region, stop the spread by looking for spotted lanternflies and their eggs if traveling throughout the Commonwealth.*
- Take the spotted lanternfly permit training and exam.
- *Keep car windows rolled-up when driving through the quarantine region.*
- Destroy spotted lanternfly egg masses.
- *Put sticky-bands on trees to catch spotted lanternfly nymphs.*
- Remove ailanthus trees from properties with a certified professional.
- *Contact 1-888-4BAD-FLY to report spotted lanternflies*

According to Dr. Calvin, PSU's Emergency Management Group provided awareness to university students to prevent the spread into Centre County. Dr. Calvin said research at PSU evaluates the biology and behavior of the spotted lanternfly to look for short-term solutions and build stronger pest management programs for future pest management. Dr. Calvin claimed PSU has one of the top entomology departments in the country and reported researchers are studying the following:

- Genetics of the spotted lanternfly to determine their origin and biological control agents.
- *Feeding preferences of the pest and their lifecycle.*
- How the spotted lanternfly interact with bacteria and fungi.
- *How to minimalize impacts on non-targeted species.*
- The spotted lanternfly's dispersal.
- *Improved tramping technologies and methods*
- Using ultraviolet spectrum detection to assess damage

The coalition took questions from the press.

Is the coalition's goal to eradicate the spotted lanternfly in the United States?

Redding: Yes, that has been the plan from the beginning. All of us realize the complications of doing that and the difficulty with the species spreading throughout thirteen counties in the Commonwealth and three in New Jersey.

Has it spread faster in Pennsylvania than in Southeast Asia?

Newcamp: It has spread much slower thanks to PDA. In Korea, which is similar in size to Pennsylvania, it spread across the entire country in three years. Throughout the last three to four years, the spotted lanternfly spread only to thirteen counties. I believe it is a testament of the work we done so far.

Is it realistic right now to spray instead of using systemic toxicity?

Newcamp: We use bark spray and we are exploring other chemicals as well with the help of Penn State and other researchers. The bark spray is spread on the bark of the tree.

Redding: We are looking at all control methods at this point, including spot treatment. We are trying to assess the right treatment. Products are available and we are looking to see which is the best.

NEWS

Be on the Lookout for Giant Hogweed

Photo from the brochure Giant Hogweed, Penna. Dept. of Agriculture and USDA.

Giant Hogweed, an invasive plant that's extremely dangerous to humans, has been getting a lot of attention in the news and on social media recently due to new sightings in the eastern United States.

Fortunately, the plant does not seem to be spreading in Pennsylvania.

"The plant has been sighted in 500 locations in the state since it was first discovered here in the late 1990s, and has been eradicated in all but 40 of those sites," said Shannon Powers, Deputy Communications Director for the Pennsylvania Department of Agriculture. "Remember, the department only considers it eradicated after the site has been clear for three years."

Nevertheless, officials say Pennsylvanians should be on the lookout for the dangerous plant and help to stop its spread in the Keystone State.

The plant's sap and juices can produce painful blisters and long-term scarring. Contact with the eyes can cause permanent blindness. People who come into contact with the plant should immediately wash the area with soap and water, then cover the area to protect the skin from direct sunlight for 48 hours.

Identifying giant hogweed can be tricky, it is most often confused with poison hemlock, angelica, cow parsnip.

Giant hogweed has clusters of small, white flowers that form a flat-topped umbel which stretches up to two and a half feet wide. It's called giant for a reason, growing 15-feet tall with a two- to four-inch diameter stem. Its pesky seeds remain dormant for up to five years in soil and more than 100,000 seeds are produced annually by each, rapid-growing plant.

What should you do when you think you have giant hogweed on your property? First, call the giant hogweed hotline at 1-877-464-9333 or email RA-plant@pa.gov. PDA advises residents against attempting to remove the plant on their own and instead utilize the department.

Art Gover with Penn State Extension's Wildland Weed Management said repeated mowing or cutting throughout the growing season can be used to starve out the plant's energy. Although he cautions: "The residue on the cutting surface would be an issue."

Another option is to spray it with glyphosate or triclopyr in spring or early summer, with a follow-up in mid-summer. Your best option would be to prevent giant hogweed from spreading onto your property to begin with.

"Protection is a matter of vigilance," Gover said. "Don't let it get started. It's easy to spot. It really is giant."

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, August 2018.*

MARKETING

Bushels of Ideas: The 22nd Annual Are You Crazy? Farm Market Tour

Are You Crazy? Farm Market Tour went on it's 22nd annual expedition on Tuesday, July 31st. This year the on-farm markets visited were located across New Jersey. The day included a walk through the Manoff Market Gardens store in New Hope, a tour around the grounds of Terhune Orchard in Princeton, a peek at a vendor fair and CSA pick-up day at Dreyer Farms in Cranford, and an operation brief while on an orchard hayride at Wightman Farms in Morristown.

Each unique operation shared advice and lessons while the tour attendees had the opportunity to observe how it felt to walk around each business and note what details caught their attention.

Manoff Market Garden demonstrated innovative gift giving. By listening to customer feedback they created an offering for tourists looking for an airline-friendly souvenir, offering small jars of jam that could be packed in carry-on luggage. They also advised that this local gift theme was a market opportunity, as the demand for their pre-made gift baskets has transitioned from seasonal to year-round. The Manoffs description of their farm operation is as follows:

"Gary and Amy began farming on Comfort Road in 1984. Heritage Conservancy (formerly Bucks County Conservancy) reserved the land for farming. The orchard that had belonged to the Roberts' had been let go for 25 yrs., so there was a lot of land clearing to start the project. We followed a Soil Conservation Plan to preserve the soil. We erected waterways and terraces to control rain water runoff. Then installed a well and connected drip irrigation lines to use the most efficient and environmentally sound method available for keeping crops growing.

"We plant many varieties of fruit: white and yellow peaches, white and yellow nectarines, 25 different apples, 3 varieties of strawberries, blackberries, and most recently blueberries.

"When choosing varieties of peaches to plant we try to include old fash-ioned flavorful varieties.

"We offer pick your own with all the fruit varieties.

"Our customers are always amazed that there are so many choices!

Talking with Gary & Amy at Manoff Market Garden.

"We enjoy the opportunity to connect people with great tasting food and help them remember why buying locally really does make a difference.

"The farm market opens in mid-May with tunnel grown strawberries for approximately 3 weeks. After Memorial Day the field strawberries are in season. Sour cherries follow strawberries, if the spring has cooperated. We harvest early summer Raspberries until Peach season starts early July. Blueberries are available all summer. We begin apple season mid-August and stay open until apples are sold out. These days we are able to keep the apples well into May.

"The market is packed with a bounty of goodies, readily available. We make about a dozen varieties of jam from our own fruit & make apple butter and apple sauce! Our peaches are canned for us too. Keep your eye out for delicious maple syrup from family friends the Kittredge's in Vermont.

"We also try to carry a variety of local products such as honey, hand-made pottery, greens from Blue Moon Acres, and hand-made baskets and recycled shopping bags by Carolyn."

Terhune Orchard has honed in on the details of the on-farm store customer experience. Produce signage not only displays what the item is and price, but also communicates through a color coded system if grown on site and what methods are used. To engage customers of all ages, youngsters receive a free apple to munch on and stay busy with when entering the store.

Color coded signs at Terhune Orchard.

Terhune Orchards is owned and operated by the Mount family since 1975. They describe their operation as follows:

"The Terhune Orchards Farm Store is a cozy year-round market filled with fresh fruits, vegetables, fresh baked pies and other delicious baked goods, flowers and more!

"While you are here, don't miss our many other seasonal attractions, events, and options including pick-your-own, winery tasting room, educational programs, tours, birthday parties and corporate events.

- *Fruits*
- *Vegetables – more than 35 crops grown*
- *Fresh-baked goods – including apple cider donuts!*
- *Homemade desserts*
- *Jelly & jams*
- *Local gourmet specialties*

(continued on page 13)

Bushels of Ideas... (continued from page 12)

"Harvesting starts at Terhune Orchards with the first crop of strawberries in late May. Pick your own or buy freshly picked at the store. Then June brings cherries (sweet and sour), blueberries, and raspberries, all available pick-your-own and in the store. July brings summer apples and fantastic peaches. Every few days new varieties of peaches and apples are picked, so come often and find something new and different. Of course, July also launches our vegetable harvest — corn, tomato, peppers, fresh herbs, squash — every vegetable you can imagine, picked daily to insure freshness and high-quality! August showcases freestone peaches, perfect for early cooking and preserves. Nectarines are an August favorite and by the end of the month our Van Kirk Road orchard is open for Pick-Your-Own apples."

Dreyer Farms exemplified "if you build it, they will come". They shared their success story of drastically increasing sales by making the decision to build a brand new retail store. Their market was buzzing with activity; not only did we witness their CSA distribution day but also previewed what it's like at their biannual vendor fair. At this fee-based happening vendors set-up and offer product samples, bringing in event revenue while increasing exposure of what items are available for purchase.

Dreyer Farms outline the history of their operation as follows:

"Getting the history of Dreyer Farms from John and Jess Dreyer is truly amazing because each time I hear something new. Whether it's finding out about the time they had a pet pig that escaped or discovering they had yet another farm somewhere in NJ, it's always something new. So feel free to ask them about their history, if you see them around the farm!

Vendor fair in action at Dreyer Farms.

"In the late 1800s John Dreyer's grandfather, Gustav, immigrated to the United States with his brother, Henry, landing in New York City. Gustav worked in a grocery store for a year before he decided to return to what he knew–farming. After buying a pig and vegetable farm in Secaucus, the brothers farmed for a few years before wanting to obtain more land.

"Henry bought land in Cranford which is now Union County College and some of the adjacent roads surrounding it. Shortly after Henry's purchase, Gustav joined his brother in Cranford

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NEWS

PASA Seeking Farmers for Collaborative Research Projects

The Pennsylvania Association for Sustainable Agriculture (PASA) is working with farmers across the state on collaborative research improving soil health and financial health on diversified vegetable farms. These projects will benefit a range of farmer styles and scales; PASA welcomes both conventional and organic diversified vegetable farms to participate. Contact Dr. Franklin Egan at franklin@pasafarming.org or at 814-349-9856 x21.

Soil Health Benchmark Study

Healthy soils are a critical resource on any farm, and growing soil health requires a sound strategy and tools to measure progress. Through the PASA Soil Health Benchmark Study, farmers are working to measure and improve their soil health over time, as individuals and as a community. Collaborating farmers submit soil samples to the Cornell Comprehensive Assessment of Soil Health and also share information about their soil management practices, including cover cropping, tillage, and amendments. Farmers will receive subsidized soil tests, a Benchmark Study report specific to their farm, and connections to a learning community of farmers working to advance soil health.

Direct Market Financial Benchmark Study

Financial benchmarks are a critical resource for any business, enabling managers to track progress over time and compare themselves to industry trends. Direct market sales (farmers markets, CSA's, etc.) are an $86 million industry in Pennsylvania, yet very little information is available to help diversified vegetable farmers make successful business decisions.

PASA is helping vegetable farmers to improve their bottom line by plugging into a nation-wide research project, coordinated with the University of Wisconsin. The data will help us understand how market channels, scale, and crop diversity influence profitability for direct market produce farmers. Participants will complete a ~90 minute survey about their farm's finances, and receive a personalized report that shows how key financial indicators for your farm compare against a group of similar Pennsylvania and Wisconsin farms. This will be a powerful resource for your farm business planning. Your farm's data will be kept strictly confidential, while general trends and insights will be shared with the broader farming community.

Contact Dr. Franklin Egan at franklin@pasafarming.org or at 814-349-9856 x707.

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Bushels of Ideas... *(continued from page 13)*

and bought the neighboring farm which is the land we still farm today.

"Dreyer Farms has a CSA, a bakery, and a nursery.

"Always striving for the highest quality, Dreyer Farms is now in its 113 year of existence with no plans to stop any time soon."

Wightman Farms has set things up to maximize customer engagement. Their pick-your-own operation comes with a membership fee, giving you access to all pay-by-the-pound picking opportunities throughout the year while increasing awareness and incentivizing frequent participation. In the store, efficient use of vertical space creates an opportunity for direct eye contact with an assortment of pies.

Wrightmans detail their operation as follows:

"For over ninety years the Wightman Family has been growing and selling fruits and vegetables at the farm. In 1922, Albert Wightman and his wife, Laetitia, purchased the first of the land that was to become Wightman Farms. Albert planted fruit trees and vegetables and drove through the nearby town of Morristown selling his harvests. Gradually the customers began to come to the farm. Even today longtime customers remember the days when the fruit and vegetables were sold from a table under the mulberry tree across the street from today's market and cider mill. Today, members of the third generation of the Wightman family along with close friends continue the tradition of selling the fruits and vegetables grown on the surrounding land.


Touring the orchards at Wightman Farms

"The head farmer, Adam, has worked and farmed this land for over 25 years already starting as a teenager. He has ventured out over the years trying new farming techniques and seeds bringing the farm to new heights! 2017 begins the third year of the popular Wightman's CSA program. Wightman's CSA often includes new crops like cantaloupe, garlic, and even fingerling potatoes! The weekly boxes provide customers with local fresh produce and recipes to incorporate them into dinner.

"Our market carries more than 120 varieties of fresh seasonal fruits and vegetables including our farm grown super sweet corn and deliciously crisp apples!

"Our market specializes in locally produced jams, jellies & preserves, breads & desserts, pastas & sauces, pickles, relishes, snacks, granolas, grains and much more! We also carry beautiful giftware including handmade custom pottery, candles and fair trade handbags.

The "Are You Crazy?" Tour is organized each year by Penn State Extension in Lehigh County and sponsored by PA Farm, PVGA, the Risk Management Agency at USDA, PA Preferred/Penna. Dept. of Agriculture and Kitchen Table Consultants.

GENERAL

On the Road: Toigo Organic Farms in 2018

Elsa Sanchez, Robert Berghage and Francesco Di Gioia

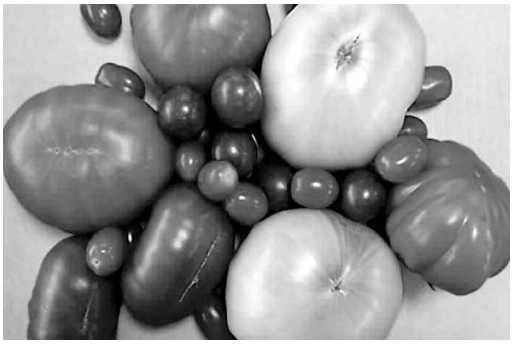


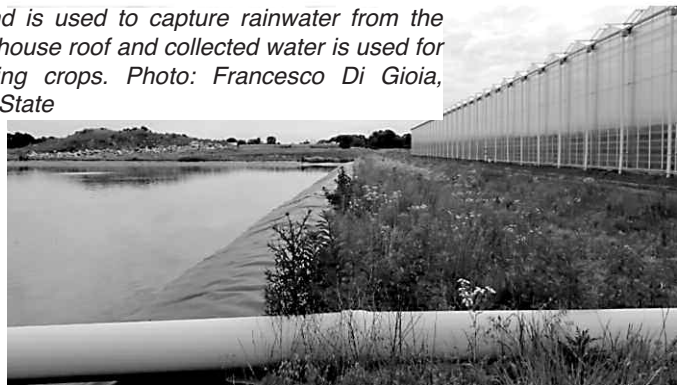
Photo courtesy of Toigo Farm.

The greenhouse at Toigo is about 24 feet tall. It is passively ventilated, with not a single fan in the structure. Note the open roof panels. Photo: Francesco Di Gioia, Penn State

Back in 2017, we visited Toigo Organic Farms where Kevin Matthews gave us a tour. We had the opportunity to go back and visit with Mark Toigo and Bram Kyer. Seeing the farm from the perspective of different people, gave us a new view of the farm. One that we thought you'd be interested in reading about.

Our tour, started outside the 5-acre greenhouse looking at a pond constructed to store rainwater collected from the roof. Over 135,000 gallons of water can be collected from an inch of rain from a roof of this size. Collected water is used to irrigate greenhouse crops from October to July. In July, algae in the pond becomes a problem and a well on the farm is used for irrigating.

While outside we also saw the area where media used to grow all their greenhouse crops is mixed. They make a custom mix including compost, coconut coir and chips, pine bark, and various organic nutrient sources. Nutrient management consists



A pond is used to capture rainwater from the greenhouse roof and collected water is used for irrigating crops. Photo: Francesco Di Gioia, Penn State

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GENERAL

On the Road... *(continued from page 15)*

of including organic nutrient sources in the planting mix, applying organic nutrients sources to planting beds by side-dressing, and fertigation. Crop nutrients are carefully monitored using frequent plant tissue testing.

The area used for blending the custom planting mix. The light brown pile is coconut coir and chips and the dark brown pile is compost. Photo: Francesco Di Gioia, Penn State

Nutrients are managed by blending compost into planting bed media, applying organic nutrient sources to the beds, and adding organic fertilizers through the drip line. This employee is sidedressing planting beds with an organic nutrient mix. Photo: Francesco Di Gioia, Penn State

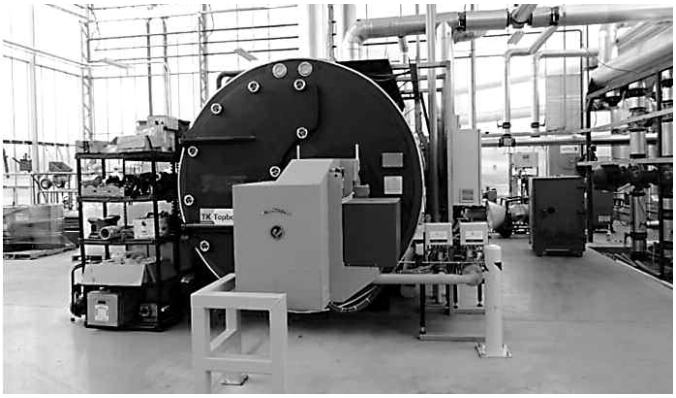
Once in the headhouse, we saw large tanks filled with organic liquid fertilizers. Up to 25 different products are used to supply the crop with nutrients. It is challenging keeping nutrients in solution for fertigation – Mark said that they are basically pumping sludge. Some nutrients are continually mechanically mixed, such as calcium, before pumping through a filter and injecting into the drip line. The drip system is also flushed weekly to help prevent clogging. Vinegar, acetic acid, and citric acid are injected to the adjust pH of the nutrient solution. At Toigo, they constantly aim to improve and this is one of the areas Mark would like to refine.

During the day, a boiler run by natural gas, is used to heat water that is stored in a large water tank. The tank is pressurized with nitrogen to maintain heat. This water is used to heat the greenhouse and for dehumidification. Dehumidification is used as a tool to prevent diseases. Carbon dioxide is captured from the boiler and pumped into the greenhouse to enrich the air.

Tomatoes-on-the-vine (TOV), heirloom and beefsteak tomatoes, orange and red peppers, and eggplants are grown as one crop per year for about 9.5 months, starting in December.

Once plants are removed in October, the greenhouse is left

Tanks of custom mixed liquid fertilizers used for fertigation. The yellow arrow is pointing to a tank where calcium fertilizer is continually mixed before injecting into the drip lines. Photo: Francesco Di Gioia, Penn State



Boiler used to heat water. Photo: Francesco Di Gioia, Penn State

This large yellow tank holds heated water that is used to heat the greenhouse and for dehumidification. Photo: Francesco Di Gioia, Penn State.

empty for about a month. During this time, the greenhouse is cleaned out and sterilized. They use high-pressure water, Oxidate, and high temperature to clean out the space. Mark said this plant-free period is critical to stay ahead of diseases.

Thank you to Mark Toigo and Bram Kyer for providing us with this tour!

Toigo Organic Farms, 305 N Old Stonehouse Rd., Carlisle, PA 17015

The authors are all with the Dept. of Plant Science at Penn State Univ. From Penn State Extension, https://extension.psu.edu/on-the-road-toigo-organic-farms-in-2018

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On the Road... (continued from page 16)

A tomatoes-on-the-vine crop. Tomato inflorescences are pruned leaving four fruits per cluster to achieve uniform size and ripening. Photo: Francesco Di Gioia, Penn State

Various colored peppers trained to a 'V' system. Photo: Francesco Di Gioia, Penn State

Heirloom tomatoes were being harvested while we were at the farm. Photo: Francesco Di Gioia, Penn State

Eggplant trained to a 'V' system. Photo: Francesco Di Gioia, Penn State

VEGETABLE PRODUCTION

August Disease Updates

Beth Gugino

Late blight was confirmed on tomato in my research trial at Rock Springs in Centre Co. the last week of August. Disease incidence and severity were low, and all the symptomatic leaves were removed to determine the genotype. A late blight specific fungicide was also applied to the entire field. The cooler temperatures and wet weather last week created favorable conditions, but the exact source of inoculum is unknown since the plants were grown from seed at the research farm. Earlier this season, the previously unknown genotype isolated from tomato in two counties in New York has been determined to be a new genotype designated as US25. A molecular DNA analysis indicates that it does not match any previously characterized genotype. Although not widespread, it is cause for concern because it is the opposite mating type of the most commonly occurring genotype US23 and interacting with US23 could enable it to survive overwinter in the soil. All reports from PA have been determined to be US23 and I have no reason to suspect that the report from Centre Co. is any different. If you suspect late blight, please contact me or your local Penn State Extension Office. It is important that we collect a sample to characterize the genotype. The presence of a new genotype could alter our current and future management recommendations. For the latest reports visit USAblight.org.

Is there fluffy white growth on your vegetable fruit? It might be **Pythium fruit rot** Observing dense white fluffy growth on developing fruit is not uncommon under very wet soil conditions. It is caused by a fungus named Pythium, which is commonly found in agricultural soils. It survives overwinter as oospores which are thick-walled long-lived structures (same structure that allows Phytophthora blight to survive in the field for years). When in the presence of free-moisture, they germinate, and eventually produce sporangia and zoospores which are "swimming" spores that move easily in very wet flooded soils and are actually attracted to the fruit.

Pythium fruit rot on immature pumpkin fruit. Photo: John Esslinger, Penn State

This is the same fungus that causes seed decay and damping off in young transplants in spring. It most commonly affects fruit that are in direct contact with the soil and has a very wide host range. It starts off as a small water-soaked spot where the fruit contacts the soil and causes the surface of the fruit to rupture and the fruit will eventually collapse.

Once you see symptoms in the field, not much can be done. In the long-term adopting practices that encourage soil drainage through improving soil health will reduce losses. Also for pumpkin and some other cucurbits, planting into a reduced or no-till system where the straw mulch creates barrier limiting direct contact between the fruit and soil will reduce losses from Pythium as well as other soilborne fruit rotting pathogens.

There are continued reports of **cucurbit downy mildew** across the region although not on any new cucurbit host types. In Pennsylvania it has been reported on cucumber, cantaloupe, butternut squash, jack-o-lantern pumpkin and Delicata squash. The drier conditions the past few days have slowed epidemic spread across the region. As cucurbit fields are done being harvested, consider plowing down the residue to reduce disease pressure both on your farm as well as for neighboring farms. If you suspect cucurbit downy mildew on your farm, please contact your local Penn State Extension Office or let Beth Gugino know via email at bkgugino@psu.edu or by phone at 814-865-7328. Every confirmed report of downy mildew enables us to improve disease forecasting accuracy for the benefit of cucurbit growers not only in Pennsylvania but all along the east coast. Even reports that are made from previously reported counties. The latest information on reports of cucurbit downy mildew can be found at the CDM ipmPIPE website.

It is not uncommon to see **anthracnose** on cucurbit crops like cucumber or summer squash. It is caused by the fungal pathogen Colletrotrichum orbiculare and only affects cucurbit crops and wild hosts. It initially causes water-soaked lesions that quickly become brown in color and necrotic with the lesion centers drying up and falling out. It can also cause a fruit rot that is covered in black spore-like structures with mats of salmon/pinkish spores. The disease is favored by warm wet conditions and is easily spread by rain splash. Resistant cultivars are an effective tool especially for cucumbers. If using fungicides, rotation for resistance management is essential specially to prevent the development of resistance to strobilurin-type fungicides (FRAC code 11).

Irregular tan cracked lesions characteristic of anthracnose on a cucumber leaf (Photo: Beth Gugino).

Powdery mildew is also a common site in pumpkin and squash fields. Spots/lesions caused by powdery mildew are white in color and develop on the upper and lower leaf surface. Fungicides are most effective when applied when symptoms are first observed. As the season progresses, continuing to protect the pumpkin handles from powdery mildew is important. Infected handles will shrivel and turn brown prematurely and significantly reduce the marketability of jack-o-lantern pumpkins. Towards the end of the season if powdery mildew becomes severe, to reduce the development of fungicide resistance consider dropping the use of any single-site mode-of-

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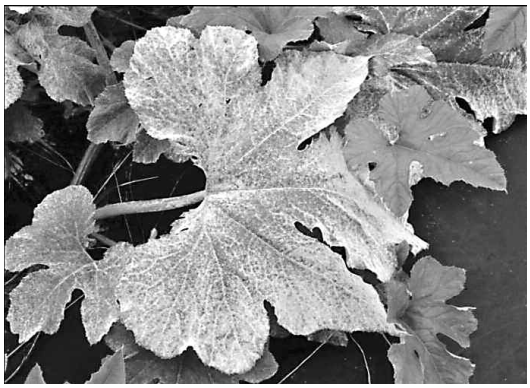
August Disease... (continued from page 18)

action fungicides such as Quintec, Torino and Vivando however, continue to apply a broad-spectrum protectant to continue protecting the handles through harvest. Also keep in mind that the fungicides most effective for downy mildew are not effective on powdery mildew and vice versa.

Be on the lookout for **downy mildew on basil**. Downy mildew is host specific so the pathogen affecting basil is different from the one affecting cucurbits. Symptoms on basil include yellowing on the upper leaf surface (similar to a nitrogen deficiency) with purplish-gray sporulation on the underside of the leaves.



Pumpkin leaf severely infected with powdery mildew. Eventually this leaf will turn yellow curl-up and die (Photo: Beth Gugino).

Seeing black soot between the bulb scales on your harvested onions? That black soot is likely the disease called **black mold** caused by a fungal pathogen, Aspergillus niger. The fungus is common is soil and crop residue and affects many vegetable crops. On onion is causes a black dusty fungal growth on and between the bulb scales and when severe can lead to bulb rot by secondary bacterial organisms. It is primarily a post-harvest problem when the bulbs remain hot under high relative humidity (>80% RH) or there are fluctuations in temperature (e.g. coming out of cold storage) that result in the formation of condensation on the bulbs while in the bins and then exposure to high temperatures. Weather conditions this season have been favorable for this disease. Reducing exposure to high temperatures and storing a low humidity will help manage black mold.

Severe downy mildew symptoms on basil. The yellow areas on the upper leaf surface have become necrotic and there is abundant sporulation on the lower leaf surface (Photo: Beth Gugino).

Dr. Gugino is with the Department of Plant Pathology and Environmental Microbiology at Penn State Univ. From the ***Pennsylvania Vegetable Disease Update,*** *Penn State Extension, August 1,15, 22 & 29, 2018.*

Black soot (sporulation) characteristic of black mold on onion caused by the fungal pathogen Aspergillus niger (Photo: Beth Gugino).

VEGETABLE PRODUCTION

High Tunnel Soluble Salts Levels

Elsa Sanchez and Thomas Ford

Soluble salts commonly found in soils are calcium, magnesium, sodium, chloride, sulfate, and bicarbonate. Potassium, ammonium, nitrate, and carbonate are also found, but in smaller quantities.

A high tunnel where the farmer is using a soilless media system to grow crops. Photo: Tom Ford, Penn State

At low levels, soluble salts generally do not harm plants. However, they can accumulate, when leaching is inadequate, to levels that do cause harm. Applying excess nutrients from inorganic fertilizers or organic nutrient sources, repeated applications of nutrients without sufficient water for leaching, and high soluble salts levels in irrigation water can cause soluble salts levels to accumulate in soils.

In the field, soluble salts levels generally do not reach levels of concern in Pennsylvania because rain, snow, and other precipitation events leach salts out of the root zone. We have heard of issues with high soluble salts levels underneath plastic-covered beds in the field; however, generally, this is not an issue. Soluble salts levels can reach levels of concern in stationary, 4-season high tunnels (covered with plastic year-round) and it is a good practice to have this tested periodically.

Leaching is limited in stationary, 4-season high tunnels. The plastic covering high tunnels excludes precipitation. Additionally, high tunnels are commonly equipped with drip irrigation systems, which also limits leaching. As a result, less water enters the soil, less leaching occurs, and soluble salts can accumulate in the root zone.

At Penn State's Agricultural Analytical Services Laboratory (the Lab), soluble salts levels can be measured as an optional test, currently costing $5. When interpreting soluble salts levels, it is important to make sure that the interpretation matches the testing procedures used. For example, the Lab uses a 1:2 dilution method (one part soil to two parts water by volume; 1:2 soil:water). Other testing methods exist, including 1:5 and 1:1 dilution methods and a saturation extraction method. Below is a table from the Lab for interpreting values for 1:2 dilution method results.

Soluble Salts (Conductance) Interpretation for Soils

mmhos/cm 1:2 Soil:Water	Effects
< 0.40	Salinity effects mostly negligible, excepting possible beans and carrots.
0.40-0.80	Very slightly saline; but yields of very salt sensitive crops such as flax, clovers (alsike, red), carrots, onions, bell peppers, lettuce, sweet potatoes may be reduced by 25 to 50%.
0.81-1.20	Moderately saline. Yield of salt-sensitive crops restricted. Seedlings may be injured. Satisfactory for well drained greenhouse soils. Crop yields reduced by 25 to 50% may include broccoli and potato plus the other plants above.
1.21-1.60	Saline soils. Crops tolerant include cotton, alfalfa, cereals, grain sorghum, sugar beets, Bermuda grass, tall wheat grass and Harding grass. Salinity higher than desirable for greenhouse soils.
1.61-3.20	Strongly saline. Only salt-tolerant crops yield satisfactory. For greenhouse crops leach soil with enough water so that 2-4 quarts (2-4L) pass through each square foot (0.1 m2) of bench area, or one pint of water (0.5 L) per inch (15 cm) pot; repeat after 1 hour. Repeat again if readings are still in high range.
> 3.2	Very strongly saline. Only salt-tolerant grasses, herbaceous plants, certain shrubs and trees will grow.

High tunnel crops respond differently to soluble salts levels. For example, beets are considered salt-tolerant, while peppers are moderately salt-sensitive. Tomatoes are considered moderately salt sensitive, but with more tolerance than peppers and potatoes. A common symptom of salt damage is dead tissue (black or brown in color) on leaf margins. Yield will also be reduced. When salt levels are too high, most plants have difficulty taking up water. This is known as a chemical induced drought. Eventually, the plant can wilt and die.

This lettuce is showing early symptoms of soluble salts stress. Note the brown tissue on the leaf margin. Photo: Tom Ford, Penn State

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This coleus is showing symptoms of salt stress. Photo: Tom Ford, Penn State

Soluble salts levels can also accumulate to levels where you can see the salts on the soil surface.

High tunnel soil is showing salt (white areas) on the surface. Photo: Elsa Sánchez, Penn State

LABORATORY RESULTS:										Optional Tests		
[1]pH	[2]P lb/A	Exchangeable Cations (meq/100g)					% Saturation of the CEC			Organic Matter %	Nitrate-N ppm	Soluble salts mmhos/cm (1:2 soil:water)
		[3]Acidity	[2]K	[2]Mg	[2]Ca	[4]CEC	K	Mg	Ca			
7.2	464	0.0	0.6	2.6	15.1	18.1	3.3	14.1	82.7	8.9		0.51

Test Methods: [1]1:1 soil:water pH, [2]Mehlich 3 (ICP), [3]Mehlich Buffer pH, [4]Summation of Cations

The high calcium level in this sample indicates the probable presence of soluble calcium. Therefore the CEC and the percent saturations were calculated using a maximum exchangeable calcium level of 15 meq/100 g. 6731

This bar is on the bottom of soil test reports from the Agricultural Analytical Services Laboratory at Penn State University. The orange box highlights the soluble salts level.

In our project, soluble salts levels ranged from 0.14 mmhos/cm to 9.27 mmhos/cm, with an overall average of 1.48 mmhos/cm. In many cases, soluble salts levels resulted in plant growth problems. The average from organic high tunnels or those using organic methods was 1.56 mmhos/cm, which falls in the saline soil category. The average was 2.39 mmhos/cm for conventional tunnels, which falls in the strongly saline soil category. At these average levels, many high tunnel crops are negatively affected.

An article that outlines ways to avoid high soluble salts levels in high tunnels can be found at https://extension.psu.edu/dealing-with-high-soluble-salt-levels-in-high-tunnels.

If your high tunnel soil has high soluble salts levels, there are things you can do. If possible, relocate the tunnel to a site with low soluble salts levels. We realize this option is not practical for most farmers but included it because it would be a solution to this problem.

Another option is to leave the plastic off the tunnel for a while when it needs to be replaced. At Penn State University's high tunnel facility, we managed four high tunnels organically in the mid-2000's. In the fall of 2007, the soluble salts level was on average 0.40 mmhos/cm. That November, the tops of the tunnels ripped off due to high-speed winds and because the plastic was getting old. We decided to leave the tops off until the spring. In April of 2008, we put new tops on and had the soluble salts level of the soils analyzed. On average, the soluble salts level decreased to 0.09 mmhos/cm or about 78%. Between November of 2007 and April of 2008, the site received about 11.5 inches of rain.

Farmers, from one of the farms participating in our project, remove the plastic from their tunnel every winter and reinstall it in the spring. They use organic nutrient sources, including animal manure, which has a high soluble salts content. By removing the plastic, they have been successful in keeping their soluble salts level <0.40 mmhos/cm, where soluble salts are not a concern.

At another farm, the farmer also removes the plastic over the winter. Conventional fertilizers and animal manure are used annually, and the soluble salts level is slightly above <0.40 mmhos/cm.

Removing the high tunnel plastic over the winter every year or when it needs to be replaced is not an option for farmers using their tunnels for year-round production. If this describes your situation, leaching may be an option for you.

Salts can be leached out of the soil. A general guideline for leaching out soluble salts from the top foot of soil is to apply 6 inches of water to leach about 50% of salts, apply 12 inches to leach about 80% of salts, and 24 inches to leach about 90% of salts (California Fertilizer Association, Western Fertilizer Handbook, 8th Ed.). A table that shows how many hours to run a drip irrigation system to apply 1 inch of water can be found at https://extension.psu.edu/determining-how-long-to-run-drip-irrigation-systems-for-vegetables. Multiply the value in the table corresponding to your situation by the number of inches you wish to apply. Leaching can also be accomplished using sprinkler or flood irrigation.

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VEGETABLE PRODUCTION

Seeding for Fall Through Spring Markets

K. Campbell-Nelson and Lisa McKeag

You may be worrying that it is too late now to extend your harvest season into late fall or early next spring, but there are still lots of crops that can be seeded now for winter markets. Depending on what you plan to grow, and for which markets, crops can be grown outside with the possibility of using covers—row covers, low tunnels, caterpillar tunnels—or into high tunnels. Below are some recommendations collected over the years for crops, varieties, and recommended seeding dates.

Field: At this point in the season, the options include direct seeding leafy crops or small, fast-growing root crops in the field. Here are some crops suggested by Danya Teitlebaum of Queens Greens in Massachusetts to seed by mid-August for a fall harvest.

Roots: Hakurei turnips, radishes, and fast-growing beet varieties for bunching.

Leaves: Lettuce, mustard greens & other Asian bunching greens, arugula, kale, chard, spinach, bok choi.

Herbs: Cilantro, parsley, and dill.

For growing outside in the open or with protection from hoops and row cover, you can seed and transplant through mid-September, depending on your location. Growth rates decline rapidly at this time of year as day length shortens and temperatures gradually drop. These crops would be ready for harvest from October through November.

Danya Teitlebaum of Queen's Greens in Amherst, MA with a winter kale crop. Photo: S.B. Scheufele

High Tunnel: For production in high tunnels for late fall, winter, or spring harvest, seeding or transplanting may go even later. Transplanting can give you a 3-week head start which may be needed when a tunnel is occupied with tomatoes until October. When planning your plantings and choosing seed, look for varieties that are specifically labeled as cold hardy. In winter high tunnels, they will be subjected to sub-freezing temperatures and multiple freeze-thaw cycles. Some crops will only be in the ground for a relatively short time, while others will need more time to mature for harvest. Below are some good variety choices in each category:

Shorter residency varieties:

- Spinach: Space, Gazelle, Kolibri, and more…look for varieties with resistance to downy mildew which is becoming more prevalent in spring tunnels (see research reports below for other recommended varieties)
- Brassica greens: Red Russian Kale, Tatsoi, Komatsuna, Mizuna, Green Wave
- Bok Choi: Black Summer, Mei Qing Choi
- Lettuce: Tango, Red Salad Bowl, Rouge D'Hiver, Salanovas
- Claytonia

Longer residency varieties:

- Radish: Tinto, Cherriette, D'Avignon
- Beet: Red Ace, Merlin, Touchstone Gold
- Chard: Fordhook Giant • Leek: Tadorna
- Scallion: White Spear
- Turnip: Hakurei
- Carrot: Napoli, Mokum, Nelson
- Kale: Winterbor, Redbor, Toscano, Siberian, Red Russian
- Collards: Champion
- Head Lettuce: Scyphos, Ermosa, Winter Density

"Days to maturity" are longer as the daylight hours get shorter and temperatures drop. The date that crops are seeded,

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Another option is to add top soil to the tunnel. On one of the farms participating in our project, the farmers had noticed issues associated with high soluble salts levels in the past. They added about 4.5 inches of topsoil to the tunnel and indicated that it helped. If you go this route be sure that the topsoil you use is low in soluble salts.

It would be useful to retest the soil after using any of these options.

If your soluble salts levels are high, hopefully, one of these options will work for your situation. For one farmer we worked with none of these options was practical. In a case such as this, in order to keep using the high tunnel, grow bags or compost socks filled with a soilless media could be used to grow crops in a soilless media hydroponic system until the soluble salts level can be lowered.

We are continuing our series examining soil test reports for high tunnels. This is based on results of soil tests from 27 Pennsylvania farms. Farmers sent soil samples from their high tunnels to Penn State's Agricultural Analytical Services Laboratory ("the Lab") for analysis. In this article we looked at soluble salts levels. In past articles, we have examined soil pH and nutrient levels:

High Tunnel Soil Test Report: Soil pH (June issue of the PVG News)

High Tunnel Soil Test Report: Soil Nutrient Levels (July issue of the PVG News)

Dr. Sanchez is with the Department of Plant Science at Penn State Univ. and Mr. Ford is with Penn State Extension in Cambria Co. From Penn State Extension, https://extension.psu.edu/high-tunnel-soil-test-report-soluble-salts-levels, August 14, 2018.

Pumpkin and Winter Squash Harvest, Curing and Storage

G. Higgins and R. Hazzard

It might feel a little early to be thinking about winter squash, but we're seeing fruit at various stages of ripeness out there and, in a year marked by frequent rains, folks might be starting to make plans for getting crops out of the field. Winter squash and pumpkin fruits that remain in the field face a daunting list of diseases, insects, and weather events that could threaten fruit quality. Once the fruit reaches maturity, prompt harvest and careful postharvest handling is generally preferable to leaving fruit in the field, particularly in a relatively wet season, such as this one. This is especially true if you know that your pumpkins or squash are in fields that were previously infected with Phytophthora blight, which can explode after a heavy rain.

Pumpkin Harvest Timing: Since the pumpkin market lasts from Labor Day to Halloween, pumpkins may need to be held for several weeks before they can be sold. One factor in deciding when to harvest is the condition of the vines. Intact foliage protects fruit from the sun, and when vines and foliage go down from powdery or downy mildew, fruit can get sunscald. Foliar diseases, especially powdery mildew, can also reduce quality of pumpkin handles, leading to reduced marketability for jack-o-lantern pumpkins. As we move into September, the other major factor in deciding when to harvest is avoiding chilling injury. Chilling hours accumulate when squash or pumpkins are exposed to temperatures below 50°F in the field or in storage. Injury increases as temperature decreases and/or length of chilling time increases. This is particularly important for squash headed into long term storage.

When defoliation exposes pumpkins to sunscald, it may be better to harvest them rather than leave them in the field. Photo: UMass Extension.

There can be extra work involved in bringing fruit in early and finding good storage locations, especially for growers who normally have pick-your-own harvest. However, we recommend that growers harvest as soon as crops are mature and store under proper conditions, if it is feasible. Proper curing and storage conditions are key for pumpkins in particular, because improper conditions can result in handles shrinking and shriveling, making the pumpkins unmarketable. If you need to hold fruit in the field for pick-your-own or any other reason, using a protectant fungicide (e.g. sulfur, oil, or chlorothalonil) along with one of the targeted powdery mildew products can help protect from black rot, powdery mildew, and other fungal fruit rots. Scout for insects feeding on the fruit and handles, which may include squash bug nymphs or adults and striped cucumber beetle, and control them if damage is evident. See the [Mid-Atlantic Commercial Vegetable Production Recommendations] for treatment recommendations.

Harvest: Despite their tough appearance, squash and pumpkin fruit are easily damaged. It is important to avoid bruising or cutting the skin during harvest. Once the rind is bruised or punctured, decay organisms will invade the fruit and quickly break it down. Place fruit gently in containers and move bins on pallets. Use gloves to protect both the fruit and the workers. For some squash, especially butternut, stems can be removed to prevent them from puncturing adjacent fruit during harvest and storage. If stems are removed, allow the stem scars to heal before putting into storage (see Curing Conditions below).

Harvest Timing for Eating Quality: For pie pumpkins and winter squashes, harvest timing determines the flavor and texture of the fruit. Before understanding when the best time is to harvest squash, it's important to understand the difference between "mature" squash and squash that is ready to be eaten. As squash fruits grow, they accumulate starch, which is then converted into sugar both during maturation in the field and after harvest during storage. The balance of starch (texture) and sugar (sweetness) in a squash determines the eating quality. Squash is "mature" when seeds are completely filled. If squash is harvested before it is mature, the fruit will use starch reserves from the flesh to fill the seeds, resulting in poor flesh quality. Immature squash will also not have enough starch to convert into sugar later on. For some squash types (e.g. acorn and delicata), the mature fruit can be eaten immediately after harvest. Other squash types (e.g. butternut, hubbard, kabocha), need more time to convert starches to sugars and must be stored for specific amounts of time before they are eaten.

Most squash varieties are mature and ready to be harvested 50-55 days after fruit set, or days after pollination (DAP). In many varieties, this is many weeks after the fruit turns a marketable color, which can be misleading. According to Dr. Brent Loy, researcher emeritus at the NH Agricultural Experiment Station, days to maturity listed in seed catalogs are often in error, especially for acorn squash; catalogs often state 70-76 days to maturity (from time of seeding) when in reality it's more like 90-100 days to maturity. It's not necessarily easy to keep track of fruit set, so there are some other indicators—see the end of this article for more information about specific varieties.

Curing Conditions: In some cases, squash needs to be stored for a short period of time (5-10 days) at a high temperature (80-85°F) and 80-85% relative humidity immediately after harvest, either in the field if weather allows, or in a well-ventilated barn, greenhouse, or high tunnel. Night temperatures should not drop below 60°F. These conditions will speed up the conversion of starches to sugars to achieve good eating quality earlier on and will allow fruit skin to harden and wounds to heal. You may not want to cure squash if it's destined for long-term storage and if it is free of wounds—squash in longterm storage should have sufficient time to convert starches to sugars and can go directly into storage conditions without the extra boost. Squash types like acorn and delicata are ready to eat at harvest (if they're harvested when they're mature!) and only need to be cured if you want to store them and the skin is wounded.

Storage: Pumpkins and winter squash should be stored in a cool, dry, well-ventilated storage area. Store fruit at 50-60°F with 50-70% relative humidity. Chilling injury is possible at tem-

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Seeding for Fall... (continued from page 22)

the climate in your growing zone, the microclimate both on your farm and inside of a tunnel, and the severity of the weather in a given year will all affect plant growth and survival. Short intervals between seeding dates become longer intervals between harvest dates. Cutting lettuce and cutting brassica crops need many seeding dates at close intervals. Full-sized kale, chard, collards, spinach - plants where you harvest the outer leaves only - need 1 or 2 dates. Some farmers have had success planting during the period with less than 10 hours of daylight - in New England, this is from around the second week in November to the fourth week in January - but there are also reports of poor germination and early bolting. Good record keeping over the years will help you to develop a fall seeding schedule that is specific for your farm.

Table1. Summer-Fall seeding for Winter Markets on a 44th Parallel Vegetable Farm in Maine (Eliot Coleman)

T/D1	Crop	Sowing Dates	Notes
D	Arugula	8/29 -9/16, and 9/22-10/2	Sow successions every 2 days until 9/16 for outdoor fall harvest and sow in late-September in unheated high tunnel for winter harvest
T	Beets	7/5, 7/19, 7/26, 8/2	Sow early July for storage and later for outdoor harvested baby beets
D	Carrots	7/5, 7/28, 8/4 -8/15	Sow early July for storage and later for fall and winter markets. Cover after November 1st and harvest before February to preserve sweetness
T	Kale	7/16, 8/1, 8/13, 8/27	Sow July for outdoor fall harvest, and mid-late August in high tunnels and greenhouses for winter harvests
T	Lettuce	8/12 -9/9	Sow outdoors and under cover. Baby leaf lettuce can be harvested outdoors when sown as late as 9/6.
T	Onion	8/252	For low tunnel overwintered onions
T	Scallion	7/21, 8/1, 8/8	For fall harvest
D	Spinach	8/16-9/3 and 9/15-9/213	Sow in August for harvest outdoors until thanksgiving. Sow in September for over wintering in high tunnels
D	Turnip	8/22-9/9 and 9/20 – 10/13	Sow late-August and cover with low tunnels for winter harvest. Sow in September-October in greenhouses for harvest until Christmas.

1 T = transplant D = direct seeded.
2 Note: n New Hampshire trials, the highest low tunnel yields came from onions seeded mid-August and transplanted September 15-October1.
3 Note: in New Hampshire trials, transplanting spinach was recommended for August-September high tunnel plantings to overcome VERY poor germination in high heat. Also, planting until late October did not compromise spring yields.

Here in Massachusetts, we may experiment with later planting dates as confirmed by research conducted in New Hampshire by Becky Sideman and Kaitlyn Orde (see research reports listed at the end of this article). Also, Johnny's Selected Seeds has developed a useful tool to calculate fall seeding dates for your area at http://www.johnnyseeds.com/growers-library/online-tools-calculators.html. See Table 1 for seeding date recommendations from Eliot Coleman of Four Season Farm in Maine. Seeding recommendations for many other crops can be found in this planting schedule chart provided by Robert Hadad at Cornell Extension at https://rvpadmin.cce.cornell.edu/uploads/doc_74.pdf.

Becky Sideman and her team at the University of New Hampshire have conducted research over the past several years on high tunnel spinach and low and high tunnel onion production. The full report for Winter Spinach Production in Unheated High Tunnels is at https://extension.unh.edu/resources/files/Resource006103_Rep8625.pdf and for Overwintering Onions for Spring Harvest at https://extension.unh.edu/resources/files/Resource005477_Rep7652.pdf.

Ms. Campbell-Nelson and Ms. McKeag are the Univ. of Massachusetts Extension. They used information provided by Danya Teitlebaum - Queens Greens, Hadley MA, Eliot Coleman - Four Season Farm, Harborside, ME, Becky Sideman and Kaitlyn Orde - University of New Hampshire Extension, and Robert Hadad - Cornell Cooperative Extension. From the ***Vegetable Notes for Vegetable Farmers in Massachusetts,*** *Univ. of Mass. Extension, Vol. 30, No. 21, August 30, 2018.*

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peratures below 50°F, and long-term storage at temperatures above 60°F will result in weight loss due to increased respiration rates. Large fluctuations in temperature favor condensation on fruit within the bin, which encourages disease. Therefore, fruit temperature should be kept as close to the temperature of the air as possible to avoid condensation and fruit rot. Relative humidity above 70% provides a favorable environment for fungal and bacterial decay organisms, and relative humidity below 50% can cause dehydration and weight loss. In a greenhouse, temperature can be managed with ventilation on sunny days; heaters will be needed for storage into November and beyond. An inner curtain can reduce heat loss and cost.

Storage life depends on the condition of the crop when it comes in and your ability to provide careful handling and a proper storage environment. All fruit placed in storage should be free of disease, decay, insects, and unhealed wounds. See the end of this article for maximum storage times for different types of squash. Fruit that has been exposed to chilling temperatures (below 50°F) will not store well and should be marketed first.

Few farms have the infrastructure to provide ideal postharvest conditions for all of their fall crops. Fortunately, finding a method that is 'good enough' often does the job. Even if it is difficult to provide the ideal conditions, storage in a shady, dry location, with fruit off the ground or the floor, is preferable to leaving fruit out in the field.

- Cucurbita pepo (acorn, delicata, sweet dumpling, some pie pumpkins): Acorn squash turns dark green 2-3 weeks after fruit set, which is 40-50 days before it should be harvested. Because acorn squash can be marketed as soon as it turns dark green, regardless of eating quality, many acorn varieties will never accumulate enough starch and will therefore never be sweet. UNH has developed two varieties, 'Honey Bear' and 'Sugar Dumpling', that both have high sugar content at harvest. Harvest C. pepo squashes when the 'ground spot' (the part of the squash that lays on the ground) is dark orange. Pie pumpkins should be harvested when the skin is fully orange. These varieties can be eaten at harvest and will store for 2-3 months.
- Cucurbita maxima (kabocha, hubbard, buttercup): Stems becomes dry and corky when the fruit is ready to be harvested. These are more susceptible than other squash to sunburn and so if vines go down from disease, they should be harvested early (40 DAP), cured, then stored at 70-75°F for 10-20 days to achieve acceptable eating quality. These have high starch content at harvest and so need to be stored for 1-2 months before being eaten, with the exception of all mini-kabochas and all red-skinned kabochas, which can be eaten at harvest. They will store for 4-6 months.

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VEGETABLE PRODUCTION

Phytophthora Blight: Considerations for Fall

Susan Scheufele

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

Many of you are probably all too familiar with the symptoms of Phytophthora blight on cucurbit fruit but you may not know that many other vegetable crops are also susceptible, though they may exhibit different symptoms. Symptoms of *P. capsici* on squash fruit are firm, round, water-soaked lesions that develop white sporulation that resembles powdered sugar under warm, moist conditions. Cucurbit plants, especially non-vining varieties, can also develop symptoms of crown rot where whole plants or vines wilt suddenly and eventually the whole plant collapses. Symptoms on pepper are distinctly different, as plants become infected with *P. capsici* via their roots and develop a crown rot that causes darkening of roots and stems and permanent wilt of foliage, while stems remain rigid. Pepper fruit remains attached to the upright stems but may eventually develop dark, water-soaked lesions which can spread to the whole fruit giving it a soft, wrinkled appearance. On tomato, *P. capsici* causes 'buckeye rot' on fruit where it comes in contact with the ground. Small brown spots on fruit grow into large, round or oblong lesions with alternating rings of light and dark-brown discoloration. The lesions are firm, with smooth margins but eventually become soft. In recent years, Phytophthora blight has been confirmed on lima and snap beans, crops which had previously been considered non-hosts. Bean pods develop water-soaked lesions followed by diffuse, white sporulation. Bean stems and crowns can also be affected and plants often collapse in low-lying areas of fields. Brassica downy mildew on broccoli leaves.

P. capsici persists in soil for many years as thick-walled resting spores called oospores. Long-lived oospores may also be spread throughout the field and the soil profile during tillage or cultivation, and they can be spread from field to field or farm to farm on infested soil clinging to tractor or truck tires, harvest buckets, workers' boots, or even discarded infected fruits. The oospores germinate to produce asexual, short-lived sporangia, which are produced on sporulating fruit lesions. These sporangia germinate directly or release 20-40 zoospores—one infected spaghetti squash is estimated to contain 44 million sporangia with the potential to release 840 million zoospores (Hausbeck and Lamour, 2004). This accounts for the rapid, above-ground spread of disease within a field or a season via surface water, rain, or splash. Outbreaks often start in low-lying or poorly drained areas of fields where zoospores are released in saturated soils and swim to find their hosts. Growers often assume that stunting or death of plants in these areas of the field is caused by waterlogging, but infection with *P. capsici* may be the real cause. Importantly, water run-off from an infested field may contaminate surface water sources used for irrigation. This has been well documented in irrigation ponds and rivers in NY and MI.

During the busy harvest period, plan on harvesting from uninfested fields before you go into infested fields with tractors, trucks, workers, and bins. Take time to wash equipment when moving between fields to remove soil or crop residues that may contain sporangia or oospores. Do not leave fruit in fields or in cull piles, as a single fruit infected with both mating types of *P. capsici* can contain thousands of oospores that could establish populations in new fields or contribute to increasing the population size and diversity within an already infected field. If the infested area is large and plant material cannot be removed from the field, make sure to till it under deeply. Remember that there is a 2-6 day lag period between infection and symptom expression so if you suspect *P. capsici* is present, hold fruit for a few days before sending large wholesale shipments out to avoid their being returned due to rot.

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

- Crop rotation: A minimum crop rotation of 3-4 years is recommended, although fields that have been out of susceptible crops for >5 years have had outbreaks in recent years. Keep in mind that every year you rotate an infested field to a non-host crop the number of spores that survive to the following year will be reduced, so any rotation you can do will help. The host range of *P. capsici* is broad but the list of non-hosts includes brassicas, carrots, onions, and grasses. Tolerant pepper varieties are available and should be planted when the disease may be present and a susceptible crop must be planted before the end of the minimum rotation period. Similarly, pumpkin varieites with hard shells, such as 'Lil Ironsides' or 'Apprentice' have been shown to be significantly less susceptible to disease than similar varieties with conventional, soft rinds.
- Cover crops can be used to help mitigate the effects of *P. capsici*, as the addition of soil organic matter stimulates beneficial microbes. A healthy soil microbial community can reduce plant pathogen activity by outcompeting them for space and nutrients, by direct parasitism of plant pathogens, by producing antibiotic compounds that slow pathogen growth, and by stimulating the plants' natural defense systems.
- Biofumigation: Research suggests that brassicaceous cover crops (especially mustards and canola) release several compounds and gases as they break down that are toxic to microorganisms, and *P. capsici* specifically. This "biofumigation" process kills plant pathogens and beneficial microorganisms repopulate the soil quickly. Successful reduction in pathogen population size through biofumigation requires large volumes of brassica residues which must be incorporated shortly before planting and need to be chopped, rototilled, cultipacked, and irrigated. Allelopathy is also a concern for some sensitive crops when using this system.

Fungicides can be used effectively and economically to reduce the impact of disease on yield, though none will provide sufficient protection to be used as the sole management strategy—they must be part of an integrated program including cultural controls. For many row crops, applying fungicides through

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Phytophthora Blight... *(continued from page 25)*

trickle irrigation (if allowed per product label) can help control crown rot, but in vining crops, foliar applications will be needed later to protect developing fruit, which may be resting on infested soil. Foliar applications can be difficult because of dense canopy. Air-assisted nozzles may help improve coverage. *P. capsici* has the ability to develop resistance to targeted fungicides, so resistance management strategies like mixing targeted fungicides with protectant fungicides and rotating modes of action with every application, are extremely important. Ridomil was previously frequently used to drench plants in the early season and some populations of *P. capsici* have become resistant to this product. Instead, you can treat transplants or seedlings with a drench treatment of a phosphorous acid fungicide such as ProPhyt, K-phite, or Fosphite, which have been shown to be effective as soil or foliar applications. Effective, targeted materials include Ranman, Forum, Tanos, and Gavel.

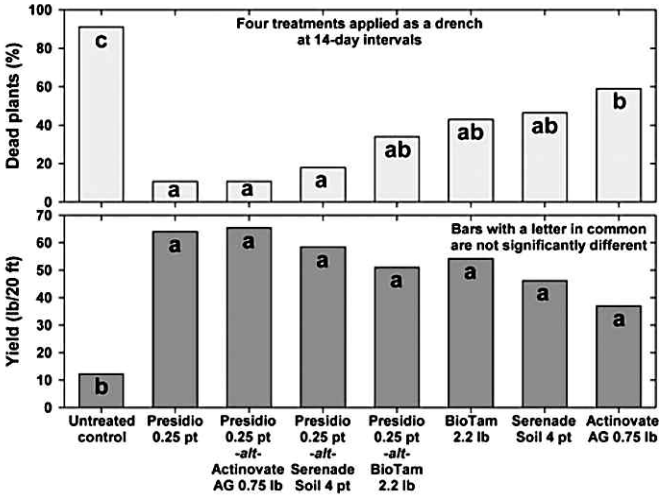
- Ranman can be used at 2.75 fl oz/A beginning before symptoms occur for a maximum of 6 applications.
- Forum can be used on all cucurbit crops at 6 oz/A every 5 to 10 days, depending on disease pressure, beginning when plants are 4-6 inches high for a maximum of 30 oz or 5 applications. It must be used in a tank mix with an effective fungicide that has a different mode of action (non-Group 40 fungicide).
- Tanos is labeled at 8-10 oz/A for a maximum of 4 applications. Tanos must be tank-mixed with a copper fungicide and a fungicide containing maneb or mancozeb. Follow a strict alternation with no consecutive applications of Tanos.
- Gavel is labeled for use at 1.5–2.0 lb/A every 7 to 10 days or when conditions are favorable for disease for a maximum of 8 applications.

Dr. Meg McGrath of Cornell University calculated the cost/A of applying these materials (numbers are from 2015), listed in the table below. Meg suggests the following program for effective control: Begin with a drench treatment of ProPhyt to transplants, then alternate among the following applied to foliage (5 to 10 day spray interval; can be extended under dry conditions):

1. Forum + copper fungicide when plants are 4-6 inches high or at 2-leaf stage
2. Ranman + copper fungicide
3. ProPhyt, Phostrol or Fosphite
4. Tanos + copper fungicide + maneb or mancozeb
5. Gavel for cucurbit crops other than pumpkin

Product	Cost/Acre/Application
Ranman	$16.75
Forum	$8.90
Tanos	$10.30
Gavel	$7.75-$10.30

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



For organic growers, there are several soil-applied materials labeled for use in controlling Phytophthora species including *P. capsici*, and while they may not work as well as targeted synthetic fungicides, they can reduce disease severity and improve yield. Dr. Mary Hausbeck at Michigan State University is a Pytophthora blight expert who has done field trials looking at efficacy of various fungicides. In 2013 she evaluated some OMRI-approved biofungicides and the results were published in the MSU Extension News for Agriculture newsletter and can be found online here. She found BioTam (Trichomderma), Serenade Soil (Bacillus spp.), and Actinovate Ag (Streptomyces) all significantly reduced plant death and increased yield relative to the untreated control Each was applied as a soil drench at the base of yellow squash plants Collapsed squash plants in a field infested with *P. capsici*. grown on black plastic. When she used these biofungicides in rotation with a synthetic fungicide, Presidio, she got even better control, indicating these materials could be used as rotational tools in conventional spray programs.

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

Information and figure from:

- Hausbeck, M.K. & K.H. Lamour. 2004. Phytophthora capsici on vegetable crops: research progress and management challenges. Plant Disease. 88(12:1292- 1303.
- Hausbeck, M.K., and Krasnow, C. 2014. “Watch for Phytophthora on vine crops.” July 18, 2014.
- McGrath, M.T. “New Developments in Managing Phytophthora Blight in Cucurbit Crops.” Vegetable MD Online, Cornell Univeristy. –

Ms. Scheufele is with the Univ. of Massachusetts Vegetable Extension. *From* ***Vegetable Notes for Vegetable Farmers in Mass.****, Univ. of Mass. Ext., Vol. 30, No. 18, August 9, 2018.*

Survey Being Conducted on Pollination Services for Blueberries

Margarita Lopez-Uribe, Kathleen Demchak and Shelby Fleischer

To better understand the status of pollination services to blueberries in the Mid-Atlantic region, we are conducting a survey that will help us identify grower's needs for pollination and specific gaps in our understanding about how to fulfill those needs.

If you grow blueberries on your farm, please consider participating in this short survey. The estimated amount of time to answer all questions is 2-3 minutes. This survey will be available until October 1, 2018 https://docs.google.com/forms/d/e/1FAIpQLSd9WzO9vwk5FdVOBnZHC-6PLKqknddjzb4jg4QwXwT67if1tg/viewform. You will have the option of participating in our research if you are interested. Please contact Margarita López-Uribe (mml64@psu.edu) if you have any questions.

Blueberries are a high-value crop that requires insect-mediated pollination to obtain profitable yield levels. The honey bee is the most important managed pollinator (of blueberries and

Blueberries are a high value crop in Pennsylvania.

many other crops), but their numbers have declined by 61% in the US during the past 70 years, with losses that hover around 40%/year in the Mid-Atlantic region. These colony losses have significantly increased honey bee rental costs (~$100/hive), which translates into increased production costs for farmers and prices for consumers.

While some native bees can provide free pollination services to blueberries, their abundance is highly dependent on the farm's landscape characteristics and size. Therefore, pollination services by native bees are often considered unreliable.

Dr. López-Uribe is currently investigating the effect of beekeeping practices and agricultural on the stability and health of honey bee and native bee populations. Margarita is interested in using citizen science to engage the public into pollinator research and to increase awareness about the environmental problems bees are currently facing. To read more about Dr. López-Uribe's research, check out the López-Uribe Lab website at http://lopezuribelab.com/.

Pumpkin and Winter...

(continued from page 23)

- Cucurbita moschata (butternut, some edible pumpkins): Butternut will turn tan 45 DAP but should not be harvested for another 2 weeks. Mini-butternut can be eaten at harvest and will store for 3 months. All others should be stored 1-2 months before eating to allow for starches to be converted into sugars and will store for 4-6 months. Carotenoid, the pigment that gives squash its yellow/orange color, also increases in storage for these squash, giving them more color and making the more nutritious.

The authors are with or formerly with the Univ. of Massachusetts Extension. It is compiled from the 2018 from Eating Quality in Winter Squash and Edible Pumpkins and The Nuts and Bolts of Fruit Quality in Cucurbits by Brent Loy researcher emeritus, New Hampshire Agricultural Experiment Station and professor emeritus of genetics, UNH. From the ***Vegetable Notes for Vegetable Farmers in Massachusetts,*** *Univ. of Mass. Extension, Vol. 30, No. 21, August 30, 2018.*

Extending Your Strawberry Season with Day Neutral Varieties

Gordon Johnson

Plasticulture strawberry planting season is quickly approaching. Growers seeking to extend their strawberry seasons should consider planting a portion of their area to day-neutral varieties. Day-neutral strawberries start fruiting 12-14 weeks after planting and have the potential to give late fall as well as early April through July production. Currently, the three varieties that have shown the most potential for extended production on Delmarva are Seascape, San Andreas, and Albion.

Albion, in particular, has shown great flexibility for season extension. It is very flexible on when it is planted in the late summer or early fall. August plantings will yield some late fall production, particularly in high tunnels. While much less productive in the main Chandler season in the spring, it has some unique properties that make it valuable to growers. First, it will give some early production, ahead of Chandler. Second, even though production is lower, it produces evenly over an extended period of time from April through July. In general, it will give 5-6 weeks more production than Chandler. It is a large, firm berry that, while not as sweet early in the season, has good quality in May and June.

Early August plantings of San Andreas will yield more fall production than Albion and San Andreas has comparable yields to Chandler in the spring with continued production through June. Both Albion and San Andreas have good quality and are firm berries that will stand up to regional shipping.

Seascape has been around for a long time and was the first of the larger sized day-neutral berries to show commercial potential in our area; however, Seascape has a softer berry and does not ship well so is best adapted to U-pick and local sales. Some grower in the region have had luck growing Seascape with multiple spring plantings spaced about three weeks apart from March through June giving summer and fall sales. Both Albion and San Andreas can also be planted in the spring for extended summer sales. Production in the heat of July and August will decline or stop unless there is a cool summer.

Because these day-neutral varieties keep blooming throughout the season, it is critical to maintain fertility, particularly with nitrogen, potassium, and calcium through fertigation. Albion, in particular, has high nitrogen needs to produce well. Disease management is also critical because these varieties bloom for an extended season. Gray mold fungicide sprays must be applied regularly throughout the extended seasons.

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