

Rock Springs Vegetable and Fruit Field Set for July 12

On July 12, 2017 growers will have the opportunity to see what's happening with vegetable and fruit research trials at Penn State's Russell E. Larson Agricultural Research Center at Rock Springs, Pennsylvania. This Field Day is in addition to one scheduled at Penn State's Southeast Research and Extension Center for July 25. The program will begin at the Horticulture Research Farm located 11 miles west of State College at Gate H on Route 45, just east of the Ag Progress Days site. Projects located on the Horticulture, Plant Pathology, Entomology and Agronomy Research Farms will be discussed. This event is being sponsored jointly by Penn State University's College of Agricultural Sciences and the Pennsylvania Vegetable Growers Association. The general itinerary is as follows:

8:00 a.m. Registration and Refreshments

9:00 – 9:30 a.m. Field Demonstrations of new equipment and technologies

9:30 – 12:30 p.m. Tours of vegetable and small fruit research plots, including projects on:

- Weed management in processing tomatoes and sweet corn
- Allium leafminer monitoring
- Cantaloupe and pepper establishment
- Hops
- Tomato breeding
- Product efficacy trials for vegetable disease management
- Sweet potato size management and butternut squash storage
- Low tunnel strawberry production
- High tunnel strawberry and raspberry production
- Cover crops for vegetable production

Pumpkin variety evaluation

Wine grapes research trials

And more!!

12:30 Lunch - A hearty sandwich accompanied by side dishes, beverage and dessert will be provided.

1:30 – 3:30 p.m. Breakout Sessions

Track 1: Tree Fruit research trials

Apple rootstock trials

Apple training system trials

Bio-renovation of orchard site

Weed control in apples

Apple cultivars

Root growth studies

Causal factors of bitter pit in apple

Asian pear cultivars

Use of DrapeNets for preventing hail damage and to modify canopy growth

Track 2: High Tunnels

Choosing a plastic covering

High tunnel venting and design options

Berry production in containers

Track 3: Hands-on Vegetable Pest and Disease Identification

Track 4: Weed Identification

3:30 – 4:00 Optional: Sprayer Calibration Demo qualifying for a pesticide applicator core re-certification credit

4:00 p.m. Adjourn

To pre-register, use the form in this newsletter on page 31, call PVGA at 717-694-3596 or email PVGA at pvga@pvga.org by July 10, 2017. Pre-registration rate is \$20.00, walk-in \$30.00.

Landisville Vegetable Field Day Set for July 25

The 2017 Pennsylvania Vegetable Field Day will be held on Tuesday, July 25, 2017, at Penn State's Southeast Research and Extension Center in Manheim (Landisville) from 9:00 a.m. to 3:00 p.m.

Registration will begin at 8:30 a.m. and growers will be able to visit the commercial exhibitors until the program begins. At 9:00 a tour of the vegetable research trials will begin.

After lunch, the following discussions that will qualify for pesticide applicator update training credits will be presented:

- Hands-on Boom Sprayer Calibration by Farm Staff
- Emerging Insects and Pest Update by Dr. Timothy Elkner, Penn State Extension and Steven Bogash, ISP Technologies
- Disease Update by Dr. Beth Gugino, Penn State Univ.

Those that want to may do a self-guided tour of the flower trials in the afternoon.

The field day enables growers to observe firsthand the various vegetable research projects underway at the research farm – much of it sponsored in part by the Association and the Pennsylvania Vegetable Marketing and Research Program.

Projects this year include:

- Russett Potato Potash / Hollow Heart / Variety Trial
- High Tunnel Round Red Slicer Determinate Tomato Variety Trial
- High Tunnel Parthenocarpic Cucumber Variety Trial
- Processing Tomato pH, Color, Yield, CV Trial
- Celery Variety Trial
- Leek Variety Trial
- Pollinator Provision Field Evaluation

(continued on page 2)

NEWS



**Pennsylvania
Vegetable Growers
Association**

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

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Landisville Vegetable Field Day... (continued from page 1)

- Corn Earworm BioType/ DNA Collection For Pesticide Resistance Project
- Pumpkin CV Trial
- Field Tomato. Red Slicer CV Trial
- Colored Bell / X10 High Tunnel Variety Trial
- Tomato Fertility Program Comparison Demo
- Flower Trial Tour
- Pollinator Flowering Plant Evaluation

The registration fee for the Field Day is \$20 for adults (\$10 for children 3 to 10, children under 3 are free) if registered by July 21. After July 21, the late registration fee will be \$30 for adults (\$15 for children). Registration includes a delicious buffet lunch by Enck's Catering, program materials, drinks and snacks. To pre-register, use the form in this newsletter, call PVGA at 717-694-3596 or email PVGA at pvga@pvga.org by July 21, 2017.

The Southeast Ag Research & Extension Center at Landisville is located at 1446 Auction Road, Manheim, PA 17541 - telephone 717-653-4728. Directions are as follows:

FROM HARRISBURG: Take PA 283 east toward Lancaster. Exit at Esbshade Road (just past Mt. Joy exit). Turn left at top of exit ramp. Immediately after crossing over 283, turn right on Auction Road. Follow Auction Road to "T" at Erisman Road. Turn right and follow Erisman Road around the curve. Then turn left, back onto Auction Road (just before the covered bridge). The PSU driveway is on the left as you go around the curve.

FROM LANCASTER: Take PA 283 west toward Harrisburg. Exit at Salunga exit (after the Landisville exit). Turn right at top of ramp, onto Spooky Nook Road. Turn left on Shenck Road (at the old Armstrong warehouse). Turn left across the covered bridge, then turn right on Auction Road. The PSU driveway is on the left as you go around the curve.

FROM YORK: Take US 30 east toward Lancaster. After crossing the Susquehanna River, take second exit (Prospect Road). Turn left on Prospect Road and follow for several miles. About 7 mile after crossing over PA 283 (4-lane highway), turn left on Shenck Road (at old Armstrong warehouse). Turn left across the covered bridge, then turn right on Auction Road. The PSU driveway is on the left as you go around the curve.

Monthly Grower Conference Calls Scheduled

For the past two years PVGA and the Vegetable Marketing and Research Program have been conducting monthly grower conference calls during the season to allow growers to talk about problems they are experiencing during the season – and hear recommendations from Penn State experts for solving them. This year it has been suggested that the calls be held every two weeks alternating between noontime and the evening. It was also suggested that each call have an announced topic although other questions/topics will be welcomed also. Following is the schedule for this year's calls:

Wed., July 5 – noon – Blueberries/Brambles

Wed., September 6 – noon – Vegetable Diseases

Tue., July 18 – 8:00 p.m. – Vegetable Insect Pests

Tue., September 19 – 8:00 p.m. – Pumpkins

Wed., August 2 – noon – Vegetable Diseases

Tue., October 2 – 8:00 p.m. – Veg. Research Needs

Tue., August 22 – 8:00 p.m. – Tomatoes/Peppers

Remember, questions about other topics will be allowed on any of the calls but we will try to have Penn State experts for the announced topic on the line. To participate in the calls, call toll-free 1-877-643-6951 and then enter pass code 55835024# at the scheduled time. All callers will be able to speak if they wish or they can just listen in on the discussion. Please do not call the toll-free number at other times – no one will answer. For any questions, contact the Program at 717-694-3596.

The Pennsylvania Vegetable Growers News is the official monthly publication of the Pennsylvania Vegetable Growers Association, Inc., 815 Middle Road, Richfield, PA 17086-9205 phone and fax - 717-694-3596, email - pvga@pvga.org website - www.pvga.org

Our Mission:

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

Our Vision:

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

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

Don't Miss These Summer Educational Events

PVGA is helping to sponsor several summer educational events as part of our effort to keep growers updated on the latest methods in profitable vegetable and small fruit production. Be sure to take advantage of these opportunities to get off your farm for an evening to see how other growers are meeting production challenges. You also have the chance to visit with fellow growers and share ideas, problems and solutions.

Tuesday, July 18, 2017

Central Susquehanna Summer Vegetable Meeting

This twilight meeting will be held at the Carl Wenger Farm at 1148 Old Trail Road in Liverpool from 6:00 to 8:30 in the evening. (From Selinsgrove take Route 11 south to Port Trevorton. Continue south on Rt. 11 to Old Trail Rd. at Weaver's Farm Market is on the corner of Rt. 11 south and Old Trail Rd. Go south on Old Trail Rd approximately 0.5 miles to the stop sign. Stay straight. Carl's farm is 0.25 mile. Look for the large stone farm house on the right.)

Carl grows 30 acres of vegetables south of the town of Port Trevorton in Snyder County. Carl's produce includes cucumbers, cabbage, fall tomatoes, cantaloupe, sweet corn, peppers, eggplant, and fall crops. Drip irrigation and plastic mulch is used extensively. A demonstration of bio-degradable mulch has been established for you to see.

The farm is a family operation where everyone pitches in to get the job done. The produce is marketed through the local auctions and wholesale to farm markets.

Our speakers will be Dr. Beth Gugino and Dr. Shelby Fleischer from Penn State University. We will take a walking tour of area of the farm and Beth will give an update of vegetable disease management and Shelby will discuss current insect management. Carl Wenger will demonstrate a sprayer he designed that effectively manages weeds between rows of plastic. Pesticide applicator license update training credits will be available.

There is no registration fee and light refreshments will be provided. For information, contact John Esslinger at 570-316-6518 or cje2@psu.edu. Walk-ins are welcome.

Wednesday, July 19, 2017

Twilight At-Market Workshop – Two Gander Farm

This twilight meeting will be held at the Two Gander Farm at 110 Buck Road in Downingtown from 6:30 to 8:30 in the evening.

Established in 2009, Two Gander Farm is a first-generation vegetable & CSA farm owned by Trey and Deirdre Flemming. Nestled on 10 acres, within 260 acres of preserved land owned by the Brandywine Conservancy, just outside of Downingtown, Two Gander Farm grows delicious local food for local people. The USDA certified organic farming business currently consists of a 130 member CSA, farmers markets stands, and wholesale sales to retail stores and local restaurants. Two Gander is well known for their great-tasting heirloom tomatoes, fresh lettuce selections, and high quality greens. The Two Gander apiary provides several on-farm honey selections. The Two Gander Farm mission statement; *"Through sustainable small scale farming, we strive to strengthen the connections between our local environment, the health of our community, and the vibrancy of our*



local economy."

Discussion topics for the evening will focus on various aspects of Marketing. Farm market strategies, marketing economics—for farm-markets and wholesale markets—and the differences in growing techniques between farm markets and wholesale markets will be discussed. Other focuses will include how to grow to exceed the expectations and changing demands of today's vegetable and produce shopper. Deirdre and Trey will share an overview of how they started their farm, how they bring product to market, sow-to-sale, and they will share their future marketing goals. Deirdre believes, "The way you make a customer feel is really important. Listen to your customers and grow what makes them feel good, provide them what they want to eat." Marketing conversations will also revolve around finding that happy balance between what you've produced, what's ready, and what you should bring to market.

There is no registration fee and light refreshments will be provided. To register or for information, contact John Wodehouse at 610-696-3500 or chesterext@psu.edu. Please register by July 14 if possible, but walk-ins are welcome.

July 26, 2017

Berks-Schuylkill Summer Vegetable Meeting

This annual family event will be held at the Kutztown Produce Auction at 209 Oakhaven Road in Fleetwood from 5:00 to 9:00 in the evening. A delicious supper featuring local produce will be included.

Educational discussions on pest management, variety selection, and pesticide safety qualifying for pesticide applicator license update training credits will be featured in the program for the evening.

There is no pre-registration necessary but there will be a \$10 registration fee collected at the door – call to 610-683-7161 to register if you wish. Contact Tanner Delvalle at 570-622-4225 or tcd125@psu.edu for general information.

Wednesday, August 2, 2017

Twilight At-Market Workshop – Buzas' Greenhouses

This twilight meeting will be held at Buzas' Greenhouses and Farm at 3927 Newburg Road in Easton from 6:30 to 8:30 in the evening. The farm is easily accessible from Routes 33, 22 and 78.

Buzas' Greenhouses and Farm is a third and fourth generation family-owned operation run by the Hoyer family. It has

(continued on page 8)

NEWS

National News Briefs

U.S. Budget Blueprint Proposes Cuts to Farm Programs

The 2018 budget proposal outlined recently by President Donald Trump's administration would make major cuts to U.S. Department of Agriculture programs that help farmers manage their risk and promote consumer confidence in agricultural products.

According to the American Farm Bureau Federation, the plan could gut crop insurance, reshape voluntary conservation programs, hurt confidence in meat and poultry inspection, hamper plant and animal security programs at the borders, undermine the nation's grain quality and stunt rural America's growth.

AFBF President Zippy Duvall said that while farmers are also concerned about the federal deficit, agriculture has been doing its part to fix it. Agriculture has been targeted for savings for decades and the 2014 Farm Bill, the only authorization bill to voluntarily offer savings at the time, was estimated to reduce the deficit by \$23 billion over 10 years.

"The administration's budget proposal fails to recognize agriculture's current financial challenges or its historical contribution to deficit reduction," Duvall said. "Clearly, this budget fails agriculture and rural America. Farm income is down substantially since Congress passed the last farm bill. USDA cuts of this magnitude in the current economic cycle would be unwarranted and unwise."

The administration's budget is just a blueprint and ultimately, Congress has the authority to craft and pass spending bills. Duvall said Farm Bureau is working to make sure lawmakers understand the importance of agriculture programs and is confident the proposed cuts won't be enacted.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Regulatory Reform Bill Clears Committee

An effort to cut some of the red tape surrounding federal regulations and enable programs to operate as intended has cleared its first hurdle in the U.S. Senate. The bill, by Sens. Rob Portman (R-Ohio) and Heidi Heitkamp (D-N.D.), was approved by the Senate Homeland Security and Governmental Affairs Committee, a first step in it being considered by the full chamber. If passed, it would be the first major overhaul of the federal rulemaking process in 70 years.

The bill would require a cost-benefit analysis for proposed rules, invite public participation, require agencies to disclose information that they rely upon, ensure major regulations are reviewed every 10 years, and subject major proposals to a hearing. A similar bill already passed the House.

American Farm Bureau Federation President Zippy Duvall said the bill should be welcomed by anyone who wants a more transparent and fair system. "Reasonable people may disagree about regulatory policies, but we shouldn't argue about how they are developed," he said. "When agencies use economic or scientific data, those facts and figures should be available for everyone to evaluate. When agencies decide on regulatory requirements, they should not make demands or impose costs that go beyond the will of Congress. When the government proposes rules, we should all have ample opportunity to evaluate and comment on the proposals."

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Progress Made on Trade Issues

The U.S. Department of Agriculture is creating a new position for a high-ranking official to oversee agriculture-related

trade. USDA Secretary Sonny Perdue recently announced the creation of the Under Secretary for Trade and Foreign Agricultural Affairs position along with other changes to the department's structure.

American Farm Bureau Federation President Zippy Duvall said the decision is "good news for farmers and ranchers, and assures that exports will receive daily attention at the USDA." Hel explained why international trade is a key part in keeping American agriculture competitive. More than 20 percent of U.S. crops are grown for export, he said. And U.S. agriculture has only just started to tap into the export opportunities that come from 95 percent of the world's customers living in other nations.

"Farmers and ranchers need trade agreements that level the playing field for our products and remove barriers to fair trade," Duvall said. "Although we supply the highest-quality food, fiber and fuel, our products often face a disadvantage in foreign markets with high tariffs and unnecessary, non-science based barriers to trade."

Farm Bureau was also happy to see President Donald Trump's administration opt to renegotiate, rather than scrap, the North American Free Trade Agreement (NAFTA). More than a third of U.S. agricultural exports go to partners in Canada and Mexico. Farm Bureau sees some areas to improve NAFTA as it is renegotiated, such as addressing issues related to animal and plant health, biotechnology regulations and specific commodities. But it's critical that the revised pact maintain, or even strengthen, the trade relationship American farmers have with our neighbors.

AFBF also welcomed the announcement of an agreement to restart U.S. beef exports to China. That deal could be worth more than \$2 billion to U.S. agriculture.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Grants Available for Teachers

The American Farm Bureau Foundation for Agriculture is offering \$50 teacher resource grants to be awarded to 50 teachers in celebration of the foundation's 50th anniversary. If more than 50 teachers apply, the winners will be randomly selected.

These grants are to be used to enable educators to purchase accurate agricultural literacy materials from the AFBFA store to be used in their classrooms. It is hoped that this grant will encourage teachers to educate their students with more accurate agricultural information.

For full grant guidelines visit: <http://www.agfoundation.org/projects/teacher-resource-grants>.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Honey Bees Adapt Well to Agricultural Areas

A recent study found the health of honey bee colonies may thrive in agricultural areas, including areas where pesticides are applied. Areas not associated with agriculture did not possess adequate food resources for bee colonies compared to areas engaged in row crop production, where better sources of nutrition and nectar were present. Research from University of Tennessee revealed that the lack of forages in non-agricultural areas could lead to colony collapse from starvation. Although nonlethal levels of fungicides, herbicides and insecticides were present in pollen samples, it must be recognized that mites and food availability are important factors affecting colony health and not just neonicotinoid pesticides.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.



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NEWS

State New Briefs

Proposed Agriculture Cuts In Pa. Budget Draw Concern

The deadline for state leaders to finalize the 2017-2018 state budget is at the end of June and agriculture advocates are stressing the importance of maintaining programs that keep the state's foremost industry viable.

The spending plan approved by the state House in April would cut just more than \$2 million in operating funds from the state Department of Agriculture. According to Agriculture Secretary Russell Redding, the loss of that funding translates into the loss of about 21 positions. That could mean the elimination of the Farmland Preservation Program and PA Preferred. It could also force the department to slash its contingent of food safety inspectors by up to a third.

Pennsylvania Farm Bureau is concerned about the proposal because those programs play a key role in helping new farmers get started and in ensuring the viability of Pennsylvania's food supply. PFB is also concerned about the proposed elimination of funding for the University of Pennsylvania School of Veterinary Medicine. As the state's only veterinarian school, Penn Vet plays a major role in training the next generation of veterinarians in Pennsylvania, preventing disease and ensuring food safety.

"Pennsylvania's economy and food supply depend on farmers," PFB President Rick Ebert said. "We in agriculture understand the need to tighten our belts in tough times but we also know we need to make the modest investments that help those who produce our food stay viable."

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Pennsylvania's Fiscal House Needs Repairs

Pennsylvania has a recurring structural deficit. Simply put, that means the state routinely spends more money than it takes in. That results in each state budget starting with a hole that leaders must fill with new revenue - from higher taxes or other sources - or savings from spending cuts.

Here's why that's a concern to the agricultural community: Every year that state leaders are struggling to balance the budget is a year that programs important to agriculture could be in the crosshairs for potential cuts. That adds a level of uncertainty, making it difficult for farmers and agribusinesses to plan for the long term.

State budgets have been balanced on one-time cash infusions, accounting maneuvers and small-scale niche taxes, such as those on tobacco. The state has not increased big-ticket, broad-based taxes (such as sales and income taxes) or found sustainable alternatives that would generate the same amount of funding. Nor has it taken significant steps to address major cost drivers.

The state Independent Fiscal estimated this year that if left alone, the structural deficit will increase to nearly \$3 billion by the 2021-22 budget. But there's also trouble this year. At the end of April, state revenue collections had come in \$1.2 billion short for the 2016-17 fiscal year. Since the shortfall this year will have to be made up, lawmakers now have the task of closing a more than \$3 billion gap to balance the 2017-18 budget.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Wind Power Bill Passes State House

A bill that would allow construction of wind turbines on preserved farmland has cleared the state House. House Bill 187, sponsored by Rep. Curtis Sonney of Erie County, now heads to the Senate for consideration.

The plan would allow the owner of preserved farmland with 50 or more acres to grant a right-of-way for the installation of a wind power generating system. Now, such landowners may grant rights-of-way for other utilities, such as water, sewage, electric, telephone, underground mining and gas- or oil-product lines.

The bill would add wind facilities to that list, giving farmers with preserved land the opportunity to take advantage of benefits some other farmers have seen from leasing space to wind farms.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Lyme Disease Bill Clears State House

A bill that aims to ensure patients of Lyme disease and other tick-borne illnesses are able to receive the appropriate treatment recommended by their doctors has cleared the state House. House Bill 174, by Rep. Matt Baker of Tioga County, now heads to the state Senate, where similar legislation has been introduced by Sen. Stewart Greenleaf of Montgomery County.

The proposal would require health insurance providers to cover both short- and long-term antibiotic treatments prescribed by a doctor. Now, insurers can refuse to cover long-term treatment options. Pennsylvania has ranked highest in the nation for cases of Lyme disease over the past five years. There were 59,478 confirmed cases in the state from 2002 and 2014 and another 10,817 in 2015. A state study found that citizens in every county are at risk of coming in contact with the disease.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Noxious Weeds Update Passes House

An update to the state laws governing control of noxious weeds has cleared the state House. House Bill 790, by Rep. Eddie Day Pashinski of Luzerne County, now heads to the Senate for consideration.

The measure would add to the list of noxious weeds to be controlled new species that are adversely affecting agriculture. It would also, by default, include weeds that are on the federal list and allow the state Controlled Plant and Noxious Weed Committee to conduct studies to add or delete plants from the list of controlled species.

The bill would also allow beneficial weeds with the potential to become invasive - such as *Miscanthus*, which is used for biofuel - to be cultivated in a controlled environment with a permit for research.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Pa. Department of Agriculture offers Grants for Succession and Transition Planning on Preserved Farms

The state Department of Agriculture is accepting grant applications from landowners who have preserved their farms
(continued on page 8)



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NEWS

IPM Information Once Again Available

Sweet corn, tomato and curcubit integrated pest management (IPM) weekly updates will again be available to growers in several forms this year, including email, fax or regular mail.

The PA Vegetable IPM Weekly Update will be offered again this year from mid-June through August by the Pennsylvania Vegetable Marketing and Research Program (PVMRP). To receive the Update weekly by mail growers must pay the PVMRP annual assessment. The Update is available by fax or email to others. Contact PVMRP at 717-694-3596 or pvmrp@embarqmail.com.

Growers can also obtain IPM information a toll-free recorded telephone message that is available 24-hours-a-day by calling 1-800-PENN-IPM. The IPM information will also be available on the Penn State Extension website at www.pestwatch.psu.edu.

State New Briefs *(continued from page 6)*

to assist with transition and succession plans of those lands to the next generation of agricultural producers. Grants of up to \$3,000 are available. The average age for agricultural producers in Pennsylvania is 58 years old, which means there is a need for transition plans for all types of agricultural operations, including preserved farms. Applications can be obtained by calling the Center for Farm Transitions at 717.783.3167.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Agriculture Reps to Penn State Trustees Elected

Two agriculture representatives were elected to the Penn State Board of Trustees. Keith Masser, of Schuylkill County, was re-elected to a third term while Lynn Dietrich, of Franklin County, was elected to his first term. Both will serve among the six delegates to the 38-member board who are elected by agricultural societies. Trustees serve three-year terms.

Masser, a seventh-generation potato farmer, is president and chief executive officer of both Keystone Potato Products LLC and Stermann Masser. He is a 1973 Penn State graduate and a past Pennsylvania Farm Bureau board member as well as a past member of the PVGA Board of Directors. He is also past chairman of the Board of Trustees.

Dietrich grew up on a farm in Schuylkill County—and still maintains a farm in the region—along with living on one in Franklin County. A 1973 graduate of Penn State and Franklin County Farm Bureau member, he is a retired Director of Engineering for Manitowoc Cranes and former Vice President of Product Development for Grove Manufacturing. He also runs an auction service as a part-time business.

From Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, June 2017.

Don't Miss These... *(continued from page 3)*

been providing top quality plants, flowers, fruits, vegetables and products for gardeners in the Lehigh Valley for over 50 years. The operation began with Art and Mary Buzas starting a chicken farm and growing produce which then lead to growing their own vegetable transplants and growing from there into the greenhouse business of 4 original greenhouses. Those first 4 greenhouses are still standing today with a few modifications, along with several more greenhouses and outside growing areas.

Today, Bob and Beverly (Buzas') Hoyer, along with their daughters, Nicole and Julia, run Buzas' Greenhouses & Farm. Their greenhouses (with an indoor farm stand) are open year-round every day of the week, with the exception of the winter months January and February being "call-by-appointment" only. Some of the products Buzas' have to offer include bedding plants, Proven Winner Series of plants, Ride the WAVE Petunias, water plants, home grown seasonal fruits and vegetables, perennials, shrubs, plants/decorations for every holiday and season, house plants, cut flowers, arrangements, and an assortment of products to help the home gardener with pests, disease, and ugly weeds. The Hoyer family believes that "the customer is always right and deserves nothing but the best". Aside of selling quality products, they also offer to customers, schools, and special interest clubs educational classes that are hands on, group involving, fun, and informational.

The program focus for this twilight event is marketing. Attendees will be able to learn from the outstanding plants, flowers, and produce presentations and displays at this business in its various greenhouses. The Hoyer family will give a history of their business along with a tour, as well as explain the growth to where they are today and what makes their business successful.

Website: <https://www.buzasgreenhouses.com/>

Facebook: <https://www.facebook.com/Buzas-Greenhouse-and-Farm-95433938854/>

There is no registration fee and light refreshments will be provided. To register, contact Christi Graver at 610-746-1970 or cug137@psu.edu. Walk-ins are welcome.

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NEWS

Are You Using a sUAS as a Tool?

Tanner Delvalle

You probably have heard of (or observed) the use of small unmanned aircraft systems (sUAS) throughout the country; whether it be for fun, a hobby, for capturing great aerial pictures, or commercial use.

In most cases, the media and general public refer to these aircraft as drones. Unfortunately, drones usually receive a negative connotation, primarily due to individuals who use them improperly, illegally, or even as a means to conduct terrorism. The proper term for these systems is small unmanned aircraft systems (sUAS), so we will refer to these aircraft as such in this article.

Small unmanned aircraft systems (sUAS) have been available to the public for several years, and their presence in our skies has increased exponentially over the past year. Since December of 2015, over 770,000 sUAS owners have registered their sUAS with the Federal Aviation Administration (FAA). This number is more than doubled that of the number of manned aircraft in the United States! The FAA predicts that this number will continue to rise to over 3.5 million over the next five years. Will you be one of them?

In order to use these systems legally and effectively, there are a few things that need to be understood. For starters, all sUAS weighing between 0.55 and 55 lbs. must be registered with the FAA. This process is very simple and straightforward. It can be done online, and only costs \$5.00. Performing this registration allows a user to fly a sUAS as a recreational or hobby use.

However, flying over agricultural crops in order to make a management decision does NOT constitute as recreational or hobby use, and is classified as a commercial use.

Even though a grower may not be paying someone to fly over the crop to determine if something should be done agronomically, the FAA defines this as commercial use of a sUAS. If you intend to be a commercial operator, even if just on your own farm, you will need to obtain a Remote Pilot Certificate (RPC). This is a certification that requires an initial aeronautical knowledge test to be taken at an FAA-approved testing center.

This requirement is not meant to be intimidating, but does require some light reading or studying. The information learned by studying for the test is a valuable tool to ensure safety and compliance on all sUAS missions. The testing process takes approximately 1-2 hours, and costs \$150.00. Once a user passes the knowledge test and is issued a Remote Pilot Certificate, it is valid for two years.

Commercial operators must follow the following guidelines, but waivers are obtainable to allow operations outside of these:

- Operate in Class G airspace
- Must keep the aircraft in sight
- Must fly under 400 feet (above ground level)
- Must fly during the day
- Must fly at or below 100 mph
- Must yield right of way to manned aircraft
- Must not fly over people
- Must not fly from a moving vehicle



Aerial image of Penn State's research hopyard at Rock Springs. Photo by T. Delvalle, Penn State

If you decide to become a commercial operator, or even just a recreational user, you will need to purchase a sUAS. There are several manufactures in the marketplace, at pricing from as low as \$100 to over \$25,000. Depending on your intended use, you can likely find something in the \$500 to \$1,500 range. If you only need something with a standard RGB camera, the price will be low, but special filters and cameras can become quite expensive.

Agricultural technology is rapidly expanding, and sUAS can certainly be a great tool for monitoring agricultural crops. The possibilities are seemingly endless for using sUAS, from automated flight imaging to the ability to calculate plant heights, plant counts, visualize plant stress, observe disease or insect progression, and much more. It is foreseeable that in the not-so-distant future, sUAS will be used to treat crops with pesticides or fertilizers as a precision agriculture tool.

(continued on page 12)



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NEWS

In Memory Roy Lester Brubaker

Roy Lester Brubaker, 75, of Mifflintown, died June 16 in a farming related accident at his family's farm in Cuba Mills, Juniata County, cutting short a life of love and service. He was born on August 22, 1941 in McAlisterville. Son of an early organic farming innovator, Roy is survived by his wife, Hope (Anita) Brubaker (Beidler); daughter, Angela Brubaker; son, Roy Dale Brubaker and spouse, Julie Hurst with granddaughters, Frances and Riley; daughter, Phoebe Brubaker; and daughter, Debra Brubaker and spouse, Hannah Smith-Brubaker, with grandchildren, Chandler and Owen. He is also survived by four sisters and one brother.

From 1959 to 1965 Roy taught school in Adams County and then Hagerstown, Maryland. It was there that Roy met his wife Hope. Roy completed his BA in Education at Eastern Mennonite College in 1967.

From 1967 to 1974 couple served in Somalia with the Eastern Mennonite Board of Missions and Charities. In 1974 the returned home and established the beginnings of Village Acres Farm, in Cuba Mills. In 1976, Roy and Hope returned to East Africa to serve another five year term in Nairobi, Kenya.

In 1982, Roy and Hope returned to Pennsylvania to continue to grow their organic vegetable and berry farm. Roy also served as a pastor at Lost Creek Mennonite Church from 1983 to 1993 and as the administrator at what would become Juniata Mennonite School from 1985 to 1991.

From 1993 to the present, Roy's considerable energy was poured into Village Acres Farm. Roy was heavily involved in the formation of the Tuscarora Organic Growers Cooperative (TOG), as well Pennsylvania Certified Organic (PCO). He was also a member of the Pennsylvania Association of Sustainable Agriculture (PASA) and PVGA.

Adapted from www.villageacresfarm.com

Are You Using... (continued from page 10)

No matter what you may intend to use a sUAS for, one of the most rewarding aspects of operating a sUAS is simply being able to view our landscape from a completely different perspective than we are used to. The images and videos that can be captured with very little training are quite remarkable, and will surely allow you to appreciate the beauty of our landscape.

Mr. Delvalle is with Penn State Extension in Schuylkill County. From the Vegetable, Small Fruit and Mushroom Production News, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, May 16, 2017.

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Are your labels compliant with the Food Safety Modernization Act?

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



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

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

Frecon Fruit Farm Inc
231 Powdermill Hollow Rd.
Boyetown Pa 19512

Variety: _____

Block: _____

Date: _____

Picker(s): _____

Amount: _____

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

Growers #1400 Field # 2

Size: **Large Tomatoes**

Steven Martin Packed Date
Shippensburg PA 8/11/16

Apple Cider
Keep Refrigerated

No Preservatives

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

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NEWS

Mitigating the Effects of Climate Change in Fruits and Vegetables

Gordon Johnson

Climate change has the potential to affect fruits and vegetables as temperatures increase, extreme weather events such as heavy rainfalls become more frequent, and there is a higher frequency of “false springs”.

Climate data from the Delmarva region has shown a steady increase in average temperatures over the last 100 years with average night temperatures in summer months increasing the most.

In the last 20 years, all but 3 of those years have had high temperatures above the 100 year average with 2 of the last 5 years having record highs (8 of the last 20 breaking records). We have also had 2 false springs with destructive late freezes in the last 5 years and some damage in 2017 from record high February temperatures.

Hotter temperatures can reduce yield in fruits and vegetables by lowering photosynthesis, increasing respiration, and causing reproductive failure (split sets, flower drop, reduced seed set, reduced fruit set). Quality of fruits and vegetables can also suffer due to higher numbers of size and shape culls (reduced pollination), increased internal defects (heat necrosis), and increased tissue damage (sunburn and sunscald).

As growers face the challenges of climate change, there are a number of tools or strategies that can be used to mitigate the effect of higher temperatures.

Managing mulch is one such tool. This includes changing plastic film to white, silver or metalized colors for summer production and the use of natural mulches such as rolled small grain cover crops to reduce soil temperatures. In tomatoes, high soil temperatures have been shown to reduce potassium uptake and increase fruit quality defects (white tissue and yellow shoulder). Use of white plastic has been shown to reduce these defects. Day-neutral strawberries had higher summer yields on white plastic in our trials in the past.

Radiation blocks or reflective materials can reduce heat effects by reflecting away some solar radiation. Commonly, particle films are used as radiation blocks including kaolin (white clay) based or calcium carbonate (lime) based materials. These are sprayed on plants during high temperature periods. Particle films are commonly used to reduce sunburn in watermelons in

southern regions. Wax based reflective materials have also been used in fruits such as apples to maintain color.

Shading is another strategy. Commonly, shade cloth or netting is used for this purpose. This netting comes in black, green, white, and reflective aluminum colors and is commonly used at the 20-30% shade levels. Shading is applied during the hottest periods or periods when the plant is most sensitive to heat (such as tomato fruit development). Research by Jerry Brust on tomatoes at the University of Maryland showed that shading tomatoes during fruiting can improve fruit quality and reduce culls. Research at the University of Georgia on peppers showed similar results with improvement in the number of marketable fruits. Our research with shading of strawberries for summer production showed mixed effects with shading benefiting in some years but not in others.

Metabolic and developmental regulators may also have a place in stress mitigation. These are chemicals that are applied to plants and reduce stress through different mechanisms. Ethylene inhibitors such as 1-MCP and strobilurins reduce flower and fruit drop. Hormones such as cytokinins and jasmonates alter different biochemical pathways related to plant stress. Flower or fruit initiating hormones (auxins, gibberellins,

(continued on page 15)

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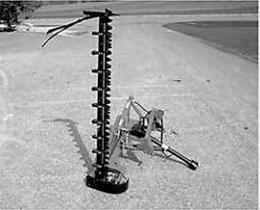
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Mitigating the Effects... (continued from page 14)

cytokinins and combinations) can improve flower and fruit set. Unfortunately, we have few labels for use of these products in vegetable crops.

Water-based cooling can be employed to reduce heat loading in crops and crop environments. Evaporative cooling has been commonly used in greenhouses to cool air entering houses and reduce temperatures for greenhouse grown vegetables. Fogs and misters have also been employed for this purpose. In the field, low water volume sprinklers, either continuous or pulsed, have been successfully used during hot daytime periods for plant cooling. Irrigation timing can also be used to as a tool. For example, by starting drip irrigation soon after dawn, soil under black plastic mulch will remain cooler for longer periods during the day.

Some biological root inoculants have also been shown to reduce plant stress. Mycorrhizal fungi can act as root system enhancers, increasing the effective area for absorbing water from the soil. The University of Delaware has released a *Bacillus subtilis* bacteria for root inoculation that has been shown to improve plant stress tolerance.

While stress mitigation tools may be more commonly used in fruits and vegetables as the climate warms, adaptive changes should be considered for more long-term stress management.

One adaptive change would be to switch to crops that are more heat tolerant for summer production. Sweet potatoes would be an example of a very heat tolerant crop.

Another adaptive change would be to alter planting dates. By planting earlier in the spring (for summer maturing crops) or later in the summer (for fall maturing crops), you can avoid the hottest growing periods and have better production potentially. We are currently studying the effects of planting dates on broccoli and Brussels sprouts at the University of Delaware.

Two other adaptive strategies would be to change to more heat tolerant cultivars (for summer production) or to varieties that mature in cooler periods (to match with later plantings). Past research in a very hot year (2012) showed significant differences between seedless watermelon varieties in heat tolerance. The 7187 triploid watermelon variety (Nunhems) shows good heat tolerance and has been shown over many years to be widely adapted throughout the Eastern and Southern watermelon producing regions. We will be conducting variety trials with snap bean varieties (processing and fresh market) to test heat tolerance in 2017. We also have been evaluating southern highbush blueberries for adaptability to Delaware conditions as our climate warms.

Finally, the most effective adaptive strategy is to breed vegetable and fruit crops that are more stress tolerant. For example, currently the lima bean breeding program at the University of Delaware is making significant progress in understanding heat stress losses in lima beans and breeding for heat tolerance.

Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. Weekly Crop Update, Univ. of Delaware Coop. Extension, Vol. 25, Issue 3, April 14, 2017.



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PA PRODUCE MONTH IS BACK!

Just like designing a crop plan, successful marketing campaigns begin way before harvest or, in this case, before August 2017, PA Produce Month. Now's the time to plan! Much like ordering seeds and repairing equipment, we're going to start to gather content, update our consumer touch points and social media platforms, familiarize ourselves with a promotional calendar, and solidify a strong marketing base. The details and suggestions on Page 2 will serve as an excellent resource to get your promotions in motion.

T

BUT FIRST, LET'S BRUSH UP ON OUR MARKETING.

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TERMS & TECHNIQUES

1 CONSISTENCY Consistency is key and has dual meaning. Content should be shared frequently, following a consistent schedule as much as possible, and the style of content shared should remain consistent. In other words, keep in touch with your customers as often as possible and make sure your style and messaging is not all over the place. From company flyers to Facebook posts, use similar colors, fonts, words, phrases, and personality in all your content.

2 CONTENT

Content includes printed and digital images or messaging that comes in contact with the consumer. Your website, blogs, social media posts, business cards, flyers, farmers market banners, and newspaper ads all qualify as content.

5 EMAILS

Focus on a tempting subject title; the rest is useless if it doesn't get opened. Make sure the content is visually compelling and encourages a click to your website or another valuable platform.

3 FACEBOOK & INSTAGRAM

Here's your chance to endear yourself to your consumers. It's important to keep a consistent focus, but use it as if you're holding a conversation with a friend or regular customer. Let your authentic personality shine and remember that a conversation should be two-way. Share "day-in-the-life" updates on your platform regularly and be educational, but also interact with and ask questions to like-minded businesses and people.

On Facebook, share industry news, links to your latest blog, quick videos, and plenty of photos. On Instagram, keep the content brief and the imagery captivating. Present a call to action as often as possible. We'll provide tips for doing this!

4 BLOG

Blogging is all about sharing your voice, personality, and knowledge. Don't be afraid to offer insider tips to colleagues and potential customers. Being generous with what you know will help you develop trust by positioning yourself as an industry expert. Keep it relatively short, from the heart, and motivate readers to take a next step - perhaps buy your product or join your email list.

6 ANALYZE

If a crop kept failing, would you just let it be? Make sure you measure effectiveness and adjust accordingly.

HOW TO GET READY FOR AUGUST



1) PA FARMERS ARE THE STAR OF THE SHOW!

PA Produce Month is all about growing your business by increasing consumer awareness of local vegetables through exciting and educational content and events. This year, WWW.PAVEGGIES.ORG will feature 10 relevant articles throughout August for you to share with your audience, from "How Top Pennsylvania Chefs Use Local Veggies in Their Kitchens" to "Keep The Veggies Coming All Year Long", and more! Once again, PA Veggies will be coordinating pop-up events across the state, including Pittsburgh on August 9, with the Pennsylvania Department of Agriculture and Feeding PA. These events help establish a physical presence for PA Produce Month and form a direct connection between consumers and PA farmers. A full calendar is available online and in the July PVGA newsletter.

2) BE PROACTIVE, MAKE IT YOUR OWN!

In addition to letting your customers and audience know about the events and using the custom content created by PA Veggies, use this opportunity to host your own events. Here are just a few ideas:

- Invite regular market goers and/or standout CSA members for a tour of the farm or a planting demonstration
- Run a special all month long that can only be redeemed if people LIKE and SHARE your Facebook page
- Host a community potluck, with your vegetables as the shining stars in each dish

3) USE YOUR RESOURCES

We'll be sharing marketing ideas, tips, materials, and information that you can use to promote your products and services through August and the rest of the season. Some items to get excited about include:

- media kit
- press release templates
- email graphics
- printable marketing material
- event ideas
- professionally written blogs
- infographs
- social media graphics
- recipes
- marketing calendar

4) FOLLOW THESE NEXT STEPS FOR SUCCESS

- EMAIL pvmrp@embarqmail.com today to join the PA Produce Month email list and receive weekly messages throughout August, featuring resources and helpful instructions on how to use those resources to promote your produce
- LIKE PA Veggies on Facebook and FOLLOW @PAVeggies on Instagram
- FAMILIARIZE yourself with the website and all the resources, created just for you!

VEGETABLE PRODUCTION

Do My Crops Need More Nitrogen?

K. Campbell-Nelson

With spring rains, nitrogen can leach quickly through sandy soils low in organic matter. On the other hand, in fields with high amounts of slowly decomposing organic matter or newly plowed fields high in sod or cover crop nitrogen may be tied up by microbes breaking down these materials, reducing the amount of nitrogen available to your vegetable crops in these early stages of growth. Routine soil tests are not good predictors of nitrogen (N) availability because plant available N fluctuates greatly throughout the season. Perhaps you have already considered this possibility and taken a Pre-Sidedress Nitrogen Test (PSNT) to determine whether or not your crop should receive any additional nitrogen to improve growth. Many vegetable crops rapidly take up nitrogen in the middle stages of their growth, and a PSNT can tell you if you have enough nitrogen available. Consult Table 1, next page, to determine when to take a PSNT sample for a given crop. Sampling instructions can be found at the UMass Soil Testing Lab website. When you get your PSNT test results, you will now need to determine how much N to apply and in what form.

Interpreting PSNT results: The PSNT measures the current level of nitrate-N (NO₃) in the soil and can be used to predict the amount of N available for the remaining period of crop growth. This test helps growers avoid the use of excess nitrogen fertilizers, thus eliminating potential run-off or leaching, and provides higher returns on labor and fertilizer Figure 3. Cucurbit Downy Mildew risk prediction map sample 5 investment. Broadcast and pre-plant nitrogen applications can be reduced or avoided entirely if nitrogen is supplied to plants at key periods of growth. The PSNT is useful in soils that are high in organic matter, have had a history of manure or manure-based fertilizer applications, or have had a cover crop turned under before planting, since microbes will be mineralizing organic nitrogen throughout the season. If the PSNT nitrate level is low, additional N would be expected to increase yields and if the nitrate levels are high, additional N would not increase yields. This test has been used successfully with corn, potatoes, peppers, cucurbits and some brassicas to predict side-dressing needs.

Research conducted by the University of Massachusetts and Connecticut indicates that an appropriate threshold for most vegetable crops is 30 ppm nitrate-N and 25ppm for sweet corn. If the soil nitrate is above this level, side-dressing or top-dressing supplemental N would be of no value and may even decrease yields. As a tool, the PSNT should be used along with a grower's experience and knowledge of their fields. For example, a field high in organic matter will continue to release nitrogen throughout the season. Research indicates that for each 1% organic matter, we can expect 20 to 40 lb of N per acre per year to be mineralized when conditions are favorable. Interpretation of PSNT results should be made with regard to weather conditions such as recent leaching rains that reduce available N, or high soil temperatures that increase mineralization and therefore available N. Weather conditions should also be considered before making N applications to avoid runoff, leaching and volatilization.

How much should I sidedress based on PSNT results? If soils have 0-25 ppm nitrate, apply the full side-dress amount recommended by the New England Vegetable Management Guide for most vegetable crops except for sweetcorn. For the same crops, at 25- 30 ppm nitrate you can cut the side-dress rate in half. Above 30 ppm no additional N is needed and could

hurt yields. Consult Table 1 for side-dress rates of specific crops.

What form of nitrogen should I use? Nitrogen is available in a number of forms; consult pages 37-38 of the Nutrient Management Guide for New England Vegetable Production for nitrogen options for organic and non-organic growers. Common sources of fertilizer N include urea, ammonium nitrate, mono-ammonium phosphate, di-ammonium phosphate, calcium nitrate and potassium nitrate. Sulphur coated urea is a material which releases N more slowly over a period of several weeks. In the soil, urea is converted to ammonium by hydrolysis, which in turn is converted through nitrification to nitrate. This process
(continued on page 20)

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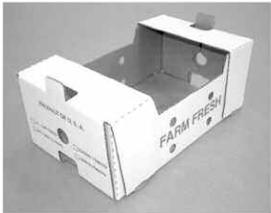
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VEGETABLE PRODUCTION

Do My Crops... (continued from page 18)

Table 1. Suggested times for soil sampling vegetable crops to conduct PSNT and Sidedress Nitrogen needs of crops.

Crop	Soil sampling time for PSNT	Sidedress N in Lbs/A ^y
Sweet corn	When plants are 6-10" tall	60-90
Cabbage Cauliflower Broccoli Brusselsprouts	2 weeks after transplanting	cabbage, broccoli, brusselsprouts: 60 cauliflower: 30
Celery	2 weeks after transplanting. Sample again in 3-4 weeks	40 twice 3-4 weeks apart
Lettuce Endive Escarole	2 weeks after transplanting or after thinning (2-4 leaves)	30-50
Beets	After thinning (2-4 leaves)	30
Pumpkin Winter Squash Cucumber Muskmelon	Before vines are 6" long	pumpkin and winter squash: 40-50 cucumber and melon: 40
Spinach	2- 4 leaves. Sample again after first cutting	30
Potato	Before plants are 6" tall	40-60 ^z
Pepper Tomato Eggplant	3-4 weeks after planting. Sample again 3-4 weeks later	pepper: 50, and 40 later at fruit set tomato: 30 twice 3-4 weeks apart eggplant: 30-50

^y If soils have 0-25 ppm nitrate, apply the full sidedress amount recommended by the New England Vegetable Management Guide. For crops other than sweet corn, at 25-30 ppm nitrate you can cut the sidedress rate in half. Above 30 ppm no additional N is needed and could hurt yields.

^z Potatoes also need 50-125lbs/A Potassium depending on soil test results.

Adapted from: Rutgers Cooperative Extension Bulletin by J. Heckman, "Soil Nitrate Testing as a Guide to Nitrogen Management for Vegetable Crops" and The New England Vegetable Management Guide.

slightly acidifies soil as hydrogen is released from ammonium (NH₄) as it converts to nitrate (NO₃). In warm soils these reactions usually happen fairly quickly if soil pH is over 6.0 and soil moisture and aeration are adequate. For organic growers, nitrogen amendment options include: manure, seed meals and emulsions, or animal byproducts such as dried blood and feather meal. Many organic nitrogen sources are not readily available to the crop, and so organic growers reason that they

should apply all their N fertilizer needs in the spring as it will slowly become available through microbial action throughout the season. However, keep in mind that previous year's fertilizer applications will continue to contribute N each following year. Also, there are more soluble and rapidly available forms of organic nitrogen now on the market which are preferable for side-dressing either incorporated into the soil or fertigated. Nitrate is the predominant form of N preferred by most plants, and any N fertilizer can be used because they will be converted to nitrate eventually. Many growers use calcium nitrate and sometimes potassium nitrate for top-dressing or side-dressing N on crops subject to calcium-related disorders. When a

slow release form of urea is used, only a small amount of ammonium is present at a given time and is unlikely to cause a problem with calcium nutrition, but N may not be available quickly enough to meet the demands of a rapidly growing crop.

In summary: Nitrogen is easily leached from the soil. If this happens, money is wasted and ground water may be contaminated. Nitrogen applications should be timed to meet crop

(continued on page 24)



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VEGETABLE PRODUCTION

Striped Cucumber Beetle: Focus on Early Control

Ruth Hazzard

Striped cucumber beetle adults spend the winter in plant debris in field edges and with the onset of warm days move rapidly into the crop. High tunnel and greenhouse cucumbers draw beetles first, followed by early field crops. Densities can be very high, especially in non-rotated fields or close to last year's cucurbit crops. Adult feeding on cotyledons and young leaves can cause stand reduction, delayed plant growth, and reduced yield. Eggs are laid in soil near the stem, and a hidden but important impact of SCB is larval root feeding, which reduces plant vigor and yield. The striped cucumber beetle also vectors *Erwinia tracheiphila*, the causal agent of bacterial wilt, and this can be more damaging than direct feeding injury. Focus on early, effective control to avoid yield impacts and to protect pollinators.

Crop rotation, transplants, and floating row cover are cultural controls that help reduce the impact of cucumber beetles. Row covers provide extra early-season heat and insect protection, but need to be removed when flowering begins.



Tender young seedlings can get pummeled by cucumber beetles early on so have a plan in place when you go to transplant!

Perimeter trap cropping has been shown to reduce or eliminate main crop sprays while providing effective control of beetles. Plant 1 or 2 rows of Blue Hubbard, buttercup squash or another Cucurbita maxima variety in an unbroken perimeter around the field. Always use 2 rows near woods or last year's fields, and space plants no wider than the between-row spacing that is used in the main crop between-row spacing. These perimeter crops will concentrate incoming beetles in the Off-white or pale yellow imported cabbageworm eggs are laid singly, on the underside of leaves, and stick straight out off the leaf. 3 border because they are generally

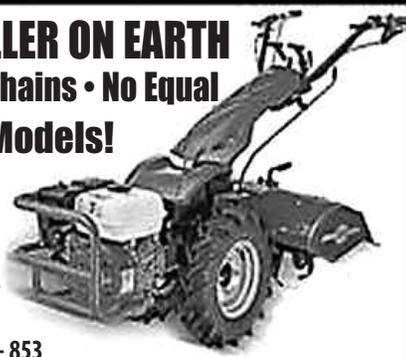
more attractive to beetles than winter squash, summer squash and pumpkin, which are Cucurbita moschata or Cucurbita pepo types. Note that some specialty pumpkin varieties are Cucurbita maxima types and very attractive to beetles. Do not use a crop that is highly susceptible to bacterial wilt (e.g. Turks' Turban) in the border. Beetles should be killed in the border, either by

(continued on page 23)



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VEGETABLE PRODUCTION
Striped Cucumber Beetle... (continued from page 22)

applying foliar insecticide when beetles first arrive or using a systemic insecticide at planting. Scout both borders and main crop to assess beetle numbers. Repeat perimeter-sprays if needed to prevent influx into the main crop, and spray the main field if thresholds are exceeded. Attractive crop types that are planted in rows within the main field also work as trap crops that draw beetles as they move around within the field. These trap crops can be selectively sprayed.

Thresholds and foliar controls. Cucurbit plants at the cotyledon and 1-2 leaf stage are more susceptible to infection with bacterial wilt than older plants. Thus, it is especially important to keep beetle numbers low before the 5-leaf stage. Scout frequently (at least twice per week up to emergence, and for two weeks after) and treat after beetles colonize the field. Scout at least 25 plants to monitor the number of beetles and damage. Use this UMass Cucurbit Scouting form to help keep track of what you find. The economic threshold depends on the crop. To prevent bacterial wilt in highly susceptible crops such as cucumber, muskmelons, summer squash, and zucchini, we recommend that beetles should not be allowed to exceed one beetle for every 2 plants. Less wilt-susceptible crops (butternut, watermelon, most pumpkins) will tolerate 1 or two beetles per plant without yield losses. Spray within 24 hours after the threshold is reached. Proper timing is key.

Conventional foliar insecticides. There are a number of broad spectrum conventional insecticides which can be used for foliar control, including carbamates, pyrethroids, and neonicotinoids. All are highly toxic to bees and should only be used before bloom. Avoid using neonicotinoid sprays (Actara (thiamethoxam) or Assail 30SG (acetameprid)) if systemics in the

same class were used (see below) See the New England Vegetable Management Guide for more details.

Systemic insecticides. Two neonicotinoid products, imidacloprid (multiple trade names) and thiamethoxam (Platinum) are registered for use in cucurbits as an in-furrow, banded, drench, or drip irrigation application to the seed/seedling root zone during or after planting/transplanting operations. Note specific application methods and rates on label. Commercially-applied seed treatments (eg thiamethoxam, Farmore) are also available for early season control.

Organic insecticides. Kaolin clay (Surround WP), pyrethrin (Pyganic Crop Spray 5.0 EC), and Azera (mixture of pyrethrin and azadiractin) are labeled for SCB in cucurbits and can be tank mixed with an additive effect. Surround should be applied before beetles arrive because it acts as a repellent and protectant and is not a contact poison. With direct-seeded crops, apply as soon as seedlings emerge if beetles are active. Transplants can be sprayed before setting out in the field. As with other insecticides, it must be re-applied after heavy rain and on new growth. Pyganic provides a short term knockdown with no residual effect. Spinosad (Entrust) is labeled for the cucurbit crop group, though not for SCB.

Reducing risk to pollinators: The New England Vegetable Management Guide [and Mid-Atlantic Commercial Recommendations] describes many steps that growers can take to protect honeybees and native pollinators when using insecticides. The issue of neonicotinoids, in particular, has received a great deal of attention in recent years. This is a group of insecticides that have a chemical structure very similar to

(continued on page 24)

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VEGETABLE PRODUCTION

Striped Cucumber Beetle...*(continued from page 23)*

nicotine. They have been widely used in agriculture because they are effective against a wide range of insects, have lower mammalian toxicity compared to older classes of insecticides, and because they can be absorbed by roots and moved through the entire plant. This trait allows for applications to be made to soil or on seeds, with less exposure to humans and to natural enemies of insect pests. Neonicotinoids are highly toxic to bees, and label requirements prohibit use on blooming crops or where there are blooming weeds or borders. Additional concern about impact on bees arises because research has shown that detectable, low concentrations of neonicotinoids can move into pollen or nectar. These are present at sublethal concentrations, but may affect the foraging behavior of bees or suppress their immune system. The long-term or colony effects are difficult to assess in the field, because bees from each colony travel long distances and forage in many different habitats and types of plants. In cucurbits, both native bees (e.g. squash bees and bumblebees) and honeybees visit flowers to gather both pollen and nectar, and are essential to crop pollination. Research in cucurbits has shown that sublethal concentrations may be found in pollen or nectar. Higher levels were found after foliar applied treatments and chemigated insecticides were applied through drip irrigation during flowering. Lower levels were detected in treatment regimes that involved a single application at planting via seed treatment, drench applied to transplants trays, or transplant water treatment. Thus, growers should avoid high rates and multiple applications, especially through trickle irrigation as the crop approaches flowering.

Beekeepers in Europe and North America have faced some difficult problems in the last 10 years, including a parasite of bees called the Varroa mite and Colony Collapse Disorder—a disorder in which bees seem to mysteriously disappear over a short period of time. Extensive research on Colony Collapse Disorder suggests that the most important causes of this syndrome are a combination of several bee diseases with other stresses. At this time, insecticide use is not considered to be a direct cause of Colony Collapse Disorder.

Ms. Hazzard is retired from the Univ. of Massachusetts Extension. Sources include Protecting Pollinators in the Yard and Garden, David Smitley, Professor of Entomology, Michigan State University, April 3, 2014 and G. Dively & A. Kamel, Insecticide Residues in Pollen and Nectar of a Cucurbit Crop and Their Potential Exposure to Pollinators, J. or Agr. and food Chemistry. 2012. Reviewed for 2017 by L. McKeag. From the Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass., Vol. 29, No. 7, May 25, 2017.

Do My Crops... *(continued from page 20)*

demands. Large pre-plant broadcast N applications should be avoided. A PSNT should be used to determine the need, if any, for additional N during the growing season. If needed, additional N can be applied by top-dressing, side-dressing or injection into a trickle irrigation system.

K. Campbell-Nelson is with the Univ. of Massachusetts Vegetable Extension and gives thanks to J. Howell, Univ. of Mass Extension and Joseph R. Heckman, Rutgers Univ. From the Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass., Vol. 29, No. 9, June 8, 2017.

Using Soil Moisture Sensors to Manage Irrigation*Katie Campbell-Nelson*

After the worst drought in over 50 years, many farmers in Massachusetts have invested in improving their irrigation systems. One of the simplest and cheapest methods to improve irrigation is to begin monitoring soil moisture with a sensor or tensiometer. Soil moisture sensors will help you determine when to begin irrigating, and almost as importantly, when to turn off irrigation in order to conserve moisture.

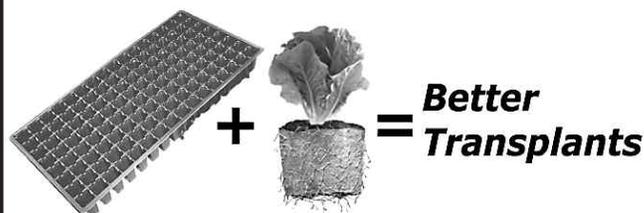
Irrigation needs of different vegetables vary greatly. Vegetable crop water requirements range from about 6" of water per season for radishes to 24" for tomatoes and watermelons.

Brassicas and Leafy Greens: Cabbage, lettuce, and spinach are generally planted at or near field capacity. Being shallow rooted, these crops benefit from frequent irrigation throughout the season. As leaf expansion relates closely to water availability, these crops—especially cabbage and lettuce—are particularly sensitive to drought stress during the period of head formation through harvest. Overwatering or irregular watering can result in burst heads. Broccoli and cauliflower are sensitive to drought stress at all stages of growth, responding to drought with reduced growth and premature heading.

Root, tuber, and bulb vegetables: Sweet potato, potato, carrot, and onion crop yields depend on the production and translocation of carbohydrates from the leaf to the root or bulb.

*(continued on page 25)***Ellepot™ Trays**

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VEGETABLE PRODUCTION

Using Soil Moisture... (continued from page 24)

The most sensitive stage of growth generally occurs as these storage organs enlarge. Carrots require an even and abundant supply of water throughout the season. Stress causes small, woody, and poorly flavored roots. Uneven irrigation can lead to misshapen or split roots in carrots, secondary growth in potatoes, and early bulbing in onions.

Fruiting vegetables: Cucumbers, melons, pumpkins and squashes, beans, peas, peppers, sweet corn, and tomatoes are most sensitive to drought stress at flowering and as fruits and seeds develop. Fruit set on these crops can be seriously reduced if water becomes limited. Maintaining moisture at field capacity during the period of fruit enlargement can reduce the incidence of fruit cracking and blossom-end rot in tomatoes. Irrigation is often reduced to a range between wilting point and field capacity as fruit and seed crops mature.

Installing and Using Moisture Sensors - A soil moisture sensor measures soil tension that a plant root exerts to suck water from the soil. This tension changes based on the rate of evapotranspiration which is equal to the quantity of water lost from the plant (transpiration) plus that lost from the soil by surface evaporation. Research has shown that maintaining soil moisture levels in a narrow range maximizes crop response. More frequent application of smaller amounts of water is better than delaying irrigation to when crops reach a wilting point. Irrigate when 25-50% of the plant available water has been used and bring soil to field capacity (10-30 centibars depending on soil texture). Irrigate at a rate appropriate for your soil type (see Table 1).

Table 1. Plant available water (PAW) and Soil Infiltration Rates for Different Soil Textures

SOIL TEXTURE	25-50% PAW (centibars)	INCH PER HOUR RATE
Coarse sand	12-20	0.75 to 1.00
Sandy Loam	20-40	0.50 to 0.75
Fine sandy loam	25-50	0.35 to 0.50
Silt loam	40-85	0.25 to 0.40
Clay loam	45-90	0.10 to 0.30

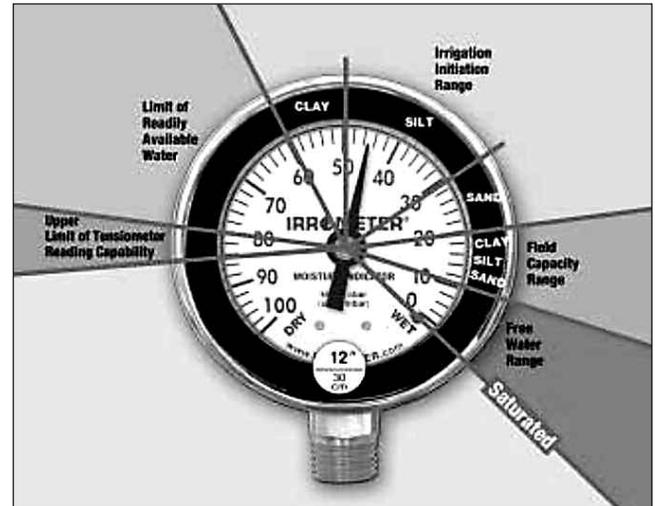


Figure 1. Irrrometer gauge interpretation

(continued on page 26)

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VEGETABLE PRODUCTION

Using Soil Moisture... (continued from page 25)

The cheapest sensors are the Irrometer tensiometers which work well, but their pressure gauges can break within the season and these must be manually checked. The Watermark, Hansen and Spectrum sensors are more expensive, and a moisture meter must be purchased in order to read the output, however, these sensors may be wired to send you text alerts related to irrigation, map out rates of evapotranspiration by taking regular measurements, or may even be wired directly into irrigation systems to turn on and shut off automatically! Use Figure 1 to determine irrigation timing when using an Irrometer, and consult Table 1 to determine irrigation timing when using other sensors.



Figure 2. A soil probe used for taking soil samples is conveniently the same diameter as the Irrometers and Watermark sensors, and makes installation a breeze.

To maintain soil moisture at field capacity for most vegetable crops, two soil moisture sensors may be installed—one at 6" and the other at the rooting depth of the crop (12" for pepper, 18-24" for tomato, cucumber and eggplant)—placed 2ft apart or more in a row. The upper sensor indicates when soil moisture near the surface is being depleted (begin irrigating) and the lower sensor shows when the moisture has moved to the bottom of the root zone (stop irrigating). In beds with drip tape, place the tensiometer about 6" from the tape toward the end of the row to make sure water is reaching the end. Depending on the soil texture, irrigate when your tensiometer or moisture sensor is between 25-50% plant available water and bring the soil moisture level up to field capacity for your soil type. Soils high in organic matter (>5%) will have a higher water holding capacity, so, monitor the rate of depletion and irrigate accordingly (perhaps more closely to a clay loam). A soil factor that influences irrigation practices is the infiltration rate. Water should not be applied at a rate greater than the rate at which the soil can absorb it. Table 1 lists typical infiltration rates of several soils.

Soil Moisture Sensors Suppliers

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 Irrometer - <http://www.irrometer.com>

Resources

Shock, C.C. et al. Irrigation Monitoring Using Soil Water Tension. EM 8900, Rev. March 2013. Oregon State University.

<https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8900.pdf>

NRCS, Chapter 9: Irrigation Water Management. 210-vi-NEH 652, IG Amend. NJ1, 06/2005. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_017781.pdf

Irrigating Vegetable Crops. UMass, Jan. 2013.
<https://ag.umass.edu/vegetable/fact-sheets/irrigating-vegetable-crops>

Glossary

Field Capacity (FC): soil water content after gravity has removed any freely draining, excess water. It occurs soon after an irrigation or rainfall event fills the soil to saturation (0 centibars). Field capacity is about 10 centibars soil water tension (0.1 atmosphere or bar), for sandy soils, and 30 centibars for medium to fine textured soils.

Plant available water (PAW) is the amount of water in the soil between field capacity and wilting point. It is expressed as inches of available water per foot of soil.

Soil water potential or **soil moisture tension** is a measurement of how tightly water clings to the soil and is expressed in units of pressure called bars or centibars (one bar is equal in strength to the pressure of one atmosphere). Generally the drier the soil, the greater the soil water potential and the harder a plant must work to draw water from the soil.

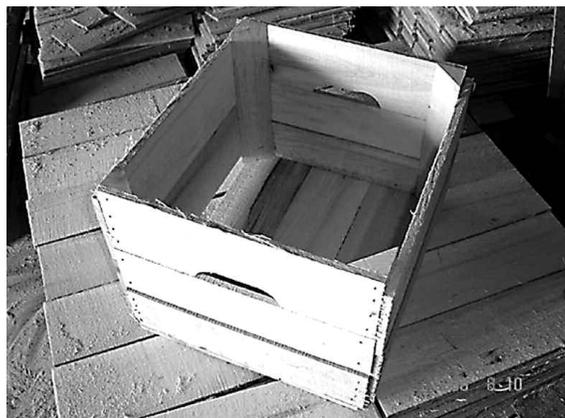
Wilting Point (WP): Soil water content at which most plants cannot recover from wilting. Generally wilting point is assumed to be 150 centibars of tension; beyond the accurate measuring capacity of most moisture sensors.

Compiled by Katie Campbell-Nelson who is with the Univ. of Massachusetts Extension. From **Vegetable Notes for Vegetable Farmers in Massachusetts**, Univ. of Mass. Extension, Vol. 29, No. 4, April 13, 2017.



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BERRY PRODUCTION

Managing Orange Rust in a Bramble Planting

Kathleen Demchak

Orange rust is a systemic disease, any plants propagated from infected plants will also be infected.



Photo 1. Early symptom of orange rust. Photo: K. Demchak

Question: I'm attempting to manage orange rust in a bramble planting. I know what the early spindly growth looks like in the spring, and I am familiar with the orange cheese puff-looking stage. But what happens between these 2 stages and what symptoms should I be looking for? Chris Claridge, Albany, NY

We've gotten more calls about orange rust this year than in any other year that I can remember, and the disease is definitely present in a lot of locations. It's a little late for finding early

stage symptoms in all but the most northern locations of the country for this year.

Photo 1 shows the early symptoms where growth appears spindly, and has a golden-orange hue to it. Leaves on these relatively weak primocane shoots may also appear pale green to yellowish and narrow with a twisted or cupped edge. Bright orange rust pustules will eventually be apparent on the lower side of the leaves of these plants. This is a good stage at which to dig out the entire infected plant—including the root system—as you can remove the plant before the spores are produced, which have potential to spread the disease to healthy plants. Orange rust is systemic within the plant, and cannot be cured.



Photo 2. K. Demchak, Penn State (continued on page 28)

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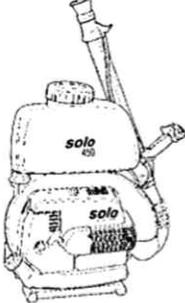
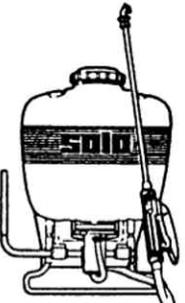
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BERRY PRODUCTION

Managing Orange... (continued from page 27)

Photo 3. K. Demchak, Penn State

Photo 2 below shows some eruptions of blister-like rust pustules of various sizes on the leaf undersides, which are often described as “waxy” in appearance. Some are quite small, and much of the leaf underside still appears green. Spores (aespore: one of the many spore types of orange rust) start to be produced at this stage followed by their release and spread by wind.

Photo 3 shows the same plants about 2 weeks later at the most apparent and familiar stage of the disease cycle. At this stage much of the leaf underside is covered with orange pustules and abundant spores are being released.

Finally, in Photo 4, the badly-affected leaves dry, curl up, and die and will eventually fall off the plant. In this last photo, you can see the accumulated spores lying on the upper surface of the leaves in the background.

It should be pointed out that there is another rust—yellow rust—which may also be present in the spring. Yellow rust is present usually only on red raspberry. Orange rust, on the other hand, has not been reported on red raspberry, instead being present on black raspberry and blackberry. Plant removal is not necessary for yellow rust, as it is not a systemic disease. With yellow rust, yellow pustules in the early spring will be present only on the upper side of the leaves and also on the canes, compared with lower sides of leaves for orange rust. Yellow rust will also not deform the leaves as it happens in case of orange rust (spindly, pale green to yellowish narrow leaves with a twisted edge).



Photo 4. K. Demchak, Penn State

How can orange rust be managed?

First, since orange rust is a systemic disease, keep in mind that any plants propagated from infected plants will also be infected. That means that canes dug from infected plants, or plants grown from root pieces taken from infected mother plants, will also be infected. So it is important to obtain clean plants from a reputable nursery source. Remove entire infected plants early in the spring whenever possible. An article written by Cassandra Swett last year can be found in the July 2016 issue of the **Pennsylvania Vegetable Growers News** or at <http://extension.psu.edu/plants/tree-fruit/news/2016/orange-rust-on-brambles2014an-ongoing-saga>. It provides additional information on the life cycle of orange rust, and the additional control measures that you can take, including which fungicides are effective and the timing for their use.

*Ms. Demchak is with the Department of Plant Science at Penn State Univ. From **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, <http://extension.psu.edu/plants/vegetable-fruit/news>, May 26, 2017.*

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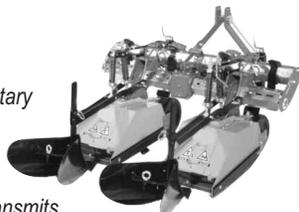
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BERRY PRODUCTION

Penn State Researchers Hope to Extend Berry Growing Season in Northeast

Kathleen Demchak

June marks the start of what many here in the Northeast believe is the sweetest part of summer — berry season. It's a time ripe with strawberry festivals, pick-your-own-berries and local farmers' markets.

For berry lovers and local farmers, the season is much too short — usually about one month of strawberry harvest and another for fresh, local raspberries — a span of time researchers at Penn State's College of Agricultural Sciences are working to extend.

"National demand for fresh strawberries and raspberries is strong and growing, but most domestic production occurs in select regions of the United States with the most suited climate," said Kathleen Demchak, senior extension associate in the Department of Plant Science.

"Growers in the Northeast are in a great position geographically to supply more berries to consumers. But our growing season is short, temperatures are variable and rainy weather during harvest can be a big problem."

Demchak and colleague Bill Lamont, professor of vegetable crops, are among a group of researchers examining how the use of high and low tunnels and plastic coverings extend the growing season for strawberries and raspberries, and as a result, increase yields while also reducing pesticide use and improving berry quality and shelf life.

Their goal is to help local farmers improve productivity, profitability and product while increasing the quantity and quality for consumers.

Why strawberries and raspberries?

According to Demchak, there's been a huge spike in the consumption of berries in recent years, with strawberries and raspberries among those preferred.

"Twenty-five years ago, the average American consumed about two pounds of berries a year. Today, that amount is about eight pounds per year, and that's a remarkable increase," Demchak said, referencing United States Department of Agriculture statistics.

She believes the increase in demand is due, in part, to reported health benefits of berries in reducing heart attack risk, protecting against some cancers and helping with weight control, among others. Among the national health organizations on the berry bandwagon is the American Diabetes Association, which puts berries on its Top 10 Superfoods List because they are low in sugar and packed with vitamins, antioxidants and fiber.

Ninety percent of strawberries grown in the U.S. come from California, a state that has optimal year-round growing conditions. On a similar note, raspberry production is most concentrated in California, Washington and Oregon. For the majority of the year, most of these berries found in grocery stores are shipped from those states.

That sometimes can lead to not-so-sweet consequences, noted Demchak.

(continued on page 30)



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BERRY PRODUCTION

Penn State Researchers... (continued from page 29)

"Overall, berries in grocery stores are of high quality. But, strawberries and raspberries are fragile and susceptible to diseases, which can result in moldy berries soon after consumers bring them home from the grocery store," she said. "Shipping time, storage methods and produce-aisle conditions can influence freshness."

Many consumers prefer fresh, locally grown berries, and that leaves some living in the Midwest and Northeast wanting for much of the year. With that fact serving as a catalyst, Demchak and Lamont connected with a group of like-minded plant scientists from several universities — Michigan State, Cornell, Rutgers, Minnesota, New Hampshire, Vermont — to come up with a solution. The first part of their research focused on the use of high and low tunnels and berry growth.

"While the benefits of high tunnels were well-demonstrated here at Penn State on many crops, including berries, over the last 20 years, we wanted to study further what kind of difference we would realize in our berry crops," Demchak said.

Their current project, in its third year with two years to go, is already yielding positive results.

The use of tunnels

Tunnels, also known as hoop greenhouses, are covered with plastic film. While tunnels share the same purpose as traditional greenhouses, they differ in a few important ways — they are less expensive to build, they do not have a constructed floor and plants are usually planted directly in the soil, as in field production.

Many benefits exist for growing plants in tunnels versus traditional open-field planting, most notably improving temperature and moisture control, pest management, harvest quality and yield.

At the Horticulture Research Farm at Penn State, Demchak, Lamont and colleague Mike Orzolek have grown a wide variety of crops in 32 high tunnels (6 feet or higher), launching a widespread adoption of season-extension technologies by growers.

Now, 18 of those tunnels are devoted solely to growing strawberries and raspberries, while over an acre of low tunnels (3 feet or lower) are being used for growing strawberries. Researchers keep daily detailed records of tunnel conditions, plant health, and the quantity and quality of fruit.

Over the years, Demchak and her colleagues found that with a combination of the right cultivars and season-extension technologies, they could extend the strawberry production season from four weeks to at least five months, and the raspberry harvest season from three-to-four weeks to four months, albeit with a few peaks and dips in production.

Yield of strawberries doubled, and yields of raspberries doubled, tripled or quadrupled compared to the field, depending on production methods. In addition, the group eliminated the use of pesticides, relying totally on natural enemies for pest control, while improving the quality and shelf life of both berries.

Current research — plastic coverings

Encouraged by the tunnel data, the researchers now are improving their strategies by studying the effects of various tunnel coverings infused with ultraviolet (UV) light blockers and stabilizers and infrared (IR) light blockers.

"As technologies involving plastics advance, a wide range of plastic choices for tunnels has become available," Demchak said. "We currently are looking at five types of plastic with a wide range of light transmittance characteristics in the UV and

IR ranges, both on high tunnels and low tunnels in the field, and the effects on plant, insect and disease response."

She explained that plants react to UV light by producing anthocyanins, which shield the plant from some of the harmful rays. These compounds make blueberries blue and strawberries red, and they also often are categorized as antioxidants.

In addition, though UV-A light is not visible to humans, it can be seen by many insects — in fact, many of them use UV wavelengths for vision. Various types of fungi also can sense its presence and use it as a cue for sporulation. And these two things can have a detrimental effect on berries.

"Therefore, if we can control UV light in the tunnels by channeling its positive effects and limiting the negative, we hope to see an improvement in growth and reduction of disease," Demchak said.

At the same time, Demchak and her colleagues are documenting infrared effects in relationship to plastic use and temperature control. Infrared radiation wavelengths are what people feel as heat. Short-wave infrared is largely responsible for heat buildup during the day, while long-wave infrared is emitted as objects cool at night.

The plastics have the potential to reduce heat loss and heating costs in late fall or early spring and are useful when growers use tunnels to grow late fall/winter or early spring crops such as lettuces and other greens.

Raspberries and strawberries grow best under cool temperatures and actually stop flowering during spells of hot temperatures in the summer. Whether improved flowering and fruiting can be achieved by using a type of plastic remains to be seen, but the team should know after this harvest.

That being noted, Demchak is optimistic about what the future holds.

"The methods we're testing show great promise and have the potential to help farmers and consumers alike. It's very exciting research," she said.

Financial support has been provided by the USDA through the Specialty Crops Research Initiative, the partnering universities and grower associations. PVGA is contributing \$8,000 annually for five years towards this project. Researchers from Lancaster University in the United Kingdom and the USDA are also aiding the research.

*Ms. Demchak is with the Department of Plant Science at Penn State Univ. From **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, <http://extension.psu.edu/plants/vegetable-fruit/news>, May 26, 2017.*

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GENERAL

PVGA Membership and Field Day Registration Form

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___ Small Fruit ___ Bedding Plants ___ Cut Flowers ___ Tree Fruit/Wine Grapes
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2017 PVGA Membership Dues

Note: 2016 PVGA members who wish to renew their membership for 2017 must pay the full dues of \$55.00 for Regular Members and \$30.00 for Associate Members.

Regular Membership Half-year membership (open to new members only - see note below). \$27.50
Open to all owner, operators and employees of vegetable, potato and berry farm operations, processing firms and supply companies. Includes newsletter subscription.

Associate Regular Membership Includes newsletter subscription.
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Must be one of the following - circle one: Student Retired Grower University Staff Extension Agt.

2017 Field Day Registration

REGISTRATION IS REQUIRED FOR EACH PERSON, including spouses. No refunds of registration fees will be made unless canceled at least one day in advance in writing, by phone (717-694-3596) or email (pvga@pvga.org). No confirmation will be mailed prior to the Field Day.

Names of Persons Registered (for use in preparing nametags)

Rock Springs Vegetable and Fruit Field Day July 12

Adult Early Registration (by July 10, 2017) Includes lunch, refreshments, and drinks @ \$20.00
Adult Late Registration (after July 10, 2017) Includes lunch, refreshments, and drinks @ \$30.00
Child Early Registration (ages 3 to 10 - by July 10, 2017) Includes lunch, refreshments, and drinks @ \$10.00
Child Late Registration (ages 3 to 10 - after July 10, 2017) Includes lunch, refreshments, and drinks @ \$15.00

Landisville Vegetable Field Day July 25

Adult Early Registration (by July 21, 2017) Includes lunch, refreshments, and drinks @ \$20.00
Adult Late Registration (after July 21, 2017) Includes lunch, refreshments, and drinks @ \$30.00
Child Early Registration (ages 3 to 10 - by July 21, 2017) Includes lunch, refreshments, and drinks @ \$10.00
Child Late Registration (ages 3 to 10 - after July 21, 2017) Includes lunch, refreshments, and drinks @ \$15.00

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Please note: Credit/debit card payments can be accepted by phone only at 717-694-3596, however we would prefer payment by check or cash. Fees can paid at the Field Day by check or cash only.

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