PENNSYLVANIA
VEGETABLE GROWERS

NEWS

May 2021 / Volume 44 Number 5

for the commercial vegetable, potato and berry grower

A promising crop of strawberries at Shenk's Berry Farm in Lititz. (Photo: John Shenk)

The first berries of the season on May 22 from Meck's Produce in Strasburg. (Photo: Meck's Produce)

Strawberry Season is Here – Keep Up to Date with Your Fellow Growers

FPVGA is offering two opportunities for berry growers to keep in touch with one another. The first is a weekly info exchange on Monday nights and the second is a Facebook group for berry growers.

Weekly Info Exchange

Since April 26, PVGA's Berry Committee has been hosting a weekly get-together for berry growers each Monday night at 8:00 p.m. Growers have a chance to get time-sensitive updates on current issues from state and regional extension personnel, exchange info with other growers, get answers to their questions, or just listen in or maybe bounce their thoughts off of others. Kathy Demchak is your weekly host.

During the first night attendees compared notes on their experiences with the frost and freeze events of the previous week, touched on strawberry variety performance on their farms, and then discussed new strawberry diseases and methods of management. The meeting wrapped up with a discussion of strawberry herbicide options for springtime use. In subsequent weeks, they discussed various experiences with plant performance from

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NEWS

National News Briefs

Apply Now for Direct Payments

Missed your chance to apply for the U.S. Department of Agriculture's signature COVID-19 assistance program for farmers? Another opportunity to apply for the CFAP 2 program, which offers direct payments to eligible producers, is now available.

Payments are limited to $250,000 per person or entity, with some exceptions for corporations, limited liability companies, or limited partnerships in which members actively provide labor or management. There is an Adjusted Gross Income limit of $900,000, except for producers who make at least 75 percent of their income from farming. Applicants must also meet conservation compliance provisions.

The following commodities are eligible for the CFAP 2 program. Visit www.farmers.gov/cfap for more details on payments.

- Specialty crops: More than 230 fruit, vegetable, horticulture and tree nut crops as well as honey, maple sap and indigo.

Apply online or through your USDA Service Center. You can also contact USDA at 877.508.8364. If you applied for the first CFAP program, the application process will be easier for the second round because USDA likely has many of your documents already on file.

Learn more by visiting www.farmers.gov/cfap.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Funding for Agriculture, Nutrition Included in Federal Stimulus Package

Programs to help agriculture and the food supply chain recover from the continued fallout of the COVID-19 pandemic will get a boost through the $1.9 trillion stimulus plan passed by Congress and signed by President Joe Biden in March.

The American Rescue Plan Act of 2021 allocates about $10.4 billion for efforts to strengthen agriculture and the food supply chain. That includes a combined $3.6 billion for food purchases to be distributed to families in need, similar to the Farmers to Families Food Box program, and for farms and food processors to purchase protective equipment and implement other COVID-19 mitigation measures to protect employees.

In addition to funding for food purchases and COVID-19 mitigation costs, the package includes funding to monitor animals for the virus that causes COVID-19 and provides $100 million in relief to federally inspected small and very small meat, poultry and egg processors to help reduce overtime inspection costs as they work through a processing backlog.

Other provisions include:

- Grants to improve rural health care and assist COVID-19 vaccination efforts in rural communities.
- Debt relief to assist socially disadvantaged farmers as well as additional assistance to support socially disadvantaged farmers, including training, education, technical assistance, grants and loans.
- Funding to purchase U.S. food for international humanitarian efforts.
- Bolstering nutrition programs to assist families in need.

The agriculture and nutrition provision are part of a larger COVID-19 response and stimulus package that also includes direct payments to individuals and families up to certain income limits, expanded unemployment payments and other relief.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Help Inform Broadband Policy by Testing Connection Speed

The Federal Communications Commission is asking the public to test their in-home and mobile internet speeds to help gather data on internet connectivity.

Information about speeds gathered via the FCC's Speed Test app will help inform public policy related to expansion of broadband service.

The tests will help the FCC gather better data on broadband availability and performance so efforts to enhance connectivity can be better targeted.

The speed test app is available for Apple or Android mobile devices. You can download the app by visiting www.fcc.gov/BroadbandData/consumers#speed-test.

Learn more by visiting www.farmers.gov/cfap.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

State News Briefs

Farmers, Farmworkers Get Protected from COVID-19 as Vaccines Become Available.

All Pennsylvania adults are now eligible to make appointments to receive the coronavirus vaccine and agriculture leaders are encouraging farmers and farmworkers to sign up to protect themselves, their communities, and Pennsylvania agriculture sector.

"For the past year, you've pushed up your sleeves and continued working to feed Pennsylvania and the world as the coronavirus pandemic surged across the commonwealth," said Pennsylvania Secretary of Agriculture Russell Redding. "Now it's time to roll up your sleeves for the COVID-19 vaccine. Choosing to protect your health with the vaccine not only protects you and your family, but it ensures the availability and accessibility of our food supply. It's critical to the resilience of our industry."

Pennsylvania Farm Bureau is maintaining information about the vaccine, including how and where to find appointments, on its website: **www.pfb.com/vaccine**. Those without internet access can call the Health Hotline at **1.877.PA.HEALTH (1.877.724.3258)**

All Pennsylvania residents age 16 or older became eligible for the vaccine April 13; however, farmers along with workers in agriculture and throughout the food supply chain, have been able to make vaccination appointments since the end of March. Farm Bureau supported food and agriculture workers receiving priority access to the vaccine.

"Farmers, their employees and frontline workers throughout the food supply chain have continued to work throughout this pandemic to produce the food that we all rely upon," Pennsylvania Farm Bureau President Rick Ebert said. "By further protecting the health and safety of frontline workers in food and agriculture, Pennsylvania is also protecting our food supply and the state's number one industry."

The choice to get vaccinated against COVID-19 is voluntary and not a mandate. But health care and public health officials have stressed that widespread vaccination will be essential to curbing the spread of virus, preventing further deaths and hospitalizations and leading to the lifting of restrictions and reopening of Pennsylvania's economy. For agriculture, widespread vacci-

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Strawberry Season is Here – Keep Up to Date with Your Fellow Growers *continued from page 1*

different plant sources and changes being made in production for the upcoming season. They also compared biocontrols that they found to be effective in their strawberry fields.

The info exchange is conducted by Zoom which allows growers to connect visually and share pictures of their fields or problem plants. Growers can also participate by telephone if they are unable to connect otherwise.

Calls are open to PVGA members and non-members to maximize information exchange, so spread the word and invite your friends and neighbors to join. The meetings/calls usually last until about 9:00 p.m. unless the discussion goes longer. Currently the weekly meetings are planned through the summer for as long as their continues to be interest from growers.

The Zoom link is https://us02web.zoom.us/j/83077021881. The call-in numbers are 929 436 2866 (New York) or 301 715 8592 (Washington DC) and the meeting ID is 830 7702 1881. These numbers are the same each week.

Berry Growers Facebook Group

The PVGA Berry Committee has also established a "PVGA Berry Growers" private group on Facebook to allow berry growers to share their successes and challenges. Since this is a private group, it is only open to invited persons - which is all PVGA members. Furthermore, posts you make on the page will only be visible to the other members of the group, not the general public or consumers. Thus, if you want to ask how your fellow growers are dealing with customer problems, pest problems or other issues that consumers might misinterpret, you can do so on this page and it will not be seen by non-growers. The Committee's hope is that this will become a valuable resource for berry growers to share information.

To join the group, go to your or to your farm's Facebook page. On the top left-hand corner there will be a search box that says "search Facebook". Type in "PVGA Berry Growers" and search. A list of groups should appear. If "PVGA Berry Growers" does not appear first, keep scrolling down until you see it. Click on the title. You will see a blue button on the right that says "Join Now". Click on it. Since this is a private group you will not have access immediately. Once your join request is approved by the PVGA office, you can reach the group by searching the same way you did to join. You will be notified when there are new posts in the group.

Naturally the success of this effort will depend on you as a grower joining the group and then contributing posts and comments throughout the year.

If you have questions about the weekly info exchange or the Facebook group, contact us at pvga@pvga.org or 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

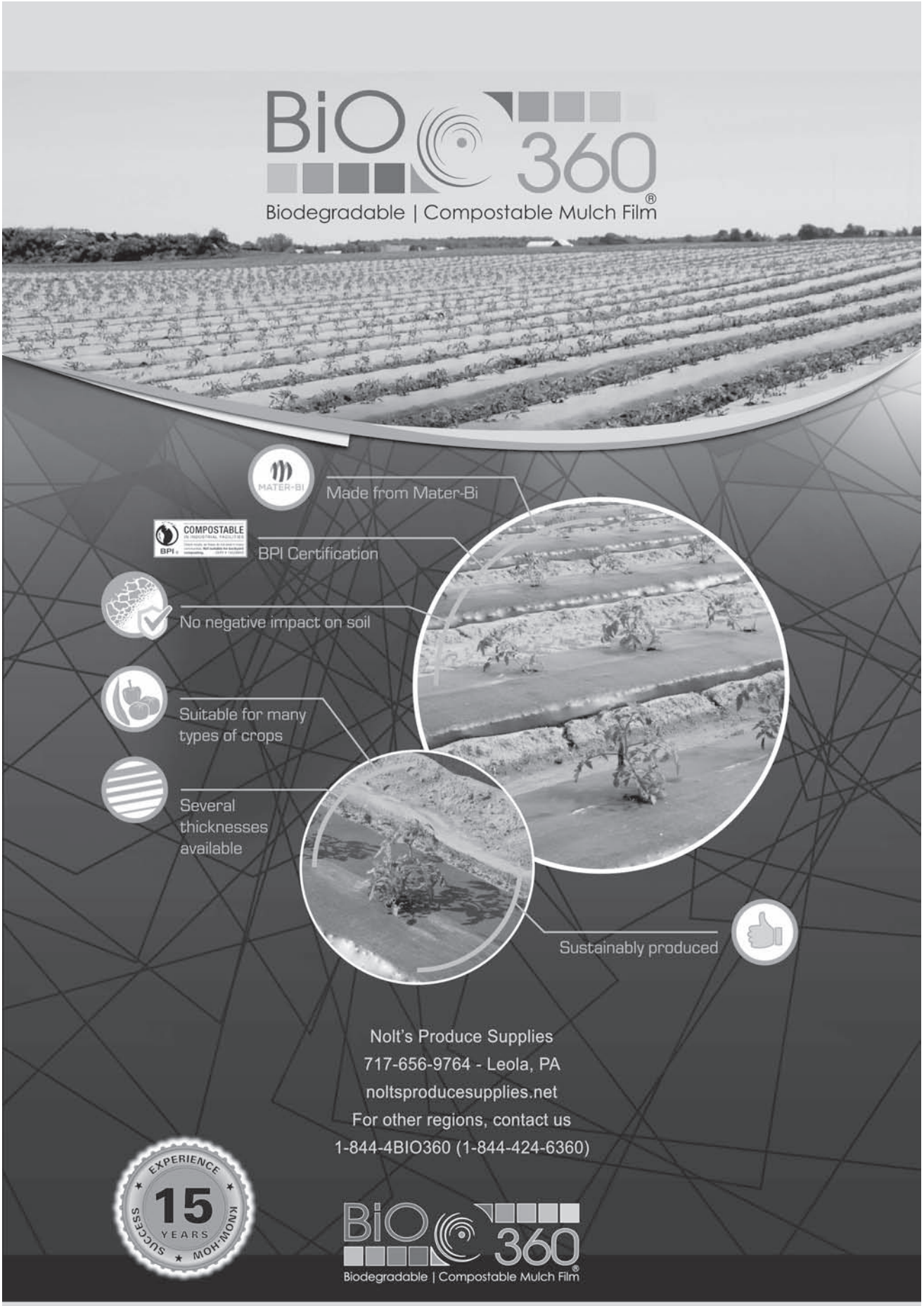
Our Mission:

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 Director, at the above address.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nation is crucial to ensuring that the food supply chain and the industry is not again disrupted by outbreaks of COVID-19.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Agritourism Liability Bill Advances in State Senate

A bill that would limit civil liability for farms that invite the public onto their property for agritourism activities is a step closer to becoming law.

The Senate Agriculture and Rural Affairs Committee voted unanimously in March to send House Bill 101 to the full Senate for consideration. The bill cleared the state House of Representatives with a bipartisan vote in February.

The bill, sponsored by Rep. Barb Gleim of Cumberland County, would offer commonsense legal protection to farms that invite the public onto their property for agritourism activities, such as corn mazes, pick-your-own produce, hayrides, and similar attractions. Specifically, the bill would grant farms that offer agritourism activities reasonable protection from lawsuits that arise from circumstances beyond their control as long as they warn visitors of the inherent risks of being on a farm. At the same time, farmers would still need to take steps to ensure guest safety.

The bill is modeled off similar laws already on the books in at least 20 other states, including New York and Ohio.

Reforming civil liability for agritourism has been a longtime priority for Pennsylvania Farm Bureau and other agriculture organizations. The measure passed the state House last fall with a bipartisan vote. The Senate then passed the legislation as part of a separate bill related to COVID-19 but that measure was ultimately vetoed by Gov. Tom Wolf. Wolf cited concerns about the COVID-19 measure as the reason for his veto and did not signal any objection to the agritourism bill.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Senate Committee Advances Bills Clarifying Sales Tax Exemptions for MAVs

A bill that clarify sales tax exemptions for multipurpose agricultural vehicles (or MAVs) is on track to be considered by the state Senate. The state Senate Finance Committee voted unanimously to advance Senate Bill 325, which deals with sales taxes on MAVS. The bill now heads to the full chamber for consideration.

Senate Bill 325, sponsored by Sen. Judy Ward of Blair County, clarifies when purchases of MAVs for agricultural purposes are exempt from state sales taxes. Farmers receive a sales tax exemption when purchasing MAVs to be used primarily for farming. However, the state Department of Revenue has a narrow definition of what is considered a farming activity. Many farm chores—maintaining and repairing pasture fencing, for example—fall outside of the department's definition.

Pennsylvania Farm Bureau has heard from an increasing number of members who have faced state tax audits after claiming the exemption for MAVs used on the farm and had to pay state sales tax because their use of the equipment did not meet the department's criteria for farming. The bill would expand the scope of activities considered "farming" to include the wide range of ways MAVs can be used on a farm to support the farmer and their business.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Spotted Lanternfly Update

Farmers across the state will have to continue to deal with the spotted lanternfly invasion this year.

In March, the Pennsylvania Department of Agriculture expanded the quarantine zone for the pesky bug by eight counties, adding Cambria, Cameron, Franklin, Lackawanna, Montour, Pike, Wayne, and Westmoreland to the list. Pennsylvania now has a total of 34 counties in the quarantine zone, which stretches all the way across the state.

Control efforts to newly identified populations of spotted lanternfly in Pennsylvania have been funded through the Pennsylvania Farm Bill for the past two years. The 2021-22 PA Farm Bill proposes another $3 million to combat spotted lanternfly.

Researchers from Penn State are expecting this year to see another large hatch.

"We are continuing to see growth of SLF populations. Each female can lay 30-150 eggs each, more than replacing herself and her mate. Eggs are able to survive cold winter conditions, so we expect a 'healthy hatch' this year," said Heather Leach, spotted lanternfly extension associate at Penn State.

Leach also said that grape vines remain at high risk to damage from spotted lanternfly infestation, while new research is providing insight as to which crops are more or less at risk.

"High populations and damage continue as SLF expands," she said. "We have looked at other crops that might be at risk, with some surprises. Early indications suggest that tree fruit is less at risk, cucumbers perhaps more so at risk."

Preliminary data shows that other crops that may be at high risk are avocado, fig, kiwi, hemp, hops, peach, and raspberry.

But, there is new research taking place and new methods for controlling the pests may be emerging.

A recent study aided by photographs submitted by citizen scientists have shown that chickens and praying mantises, along with some other birds and bugs, may act as effective predators to the spotted lanternfly.

Other findings have shown that spotted lanternflies are attracted to high vertical surfaces, like telephone poles, which may aid in trapping and controlling the bugs.

And the first dog trained to sniff out egg masses—Lucky, a female German Shepherd—was trained at PennVet's Working Dog Center. The hope is that trained dogs can help to inspect businesses like nurseries, greenhouses, vehicle fleets, and log yards. Lucky is the first dog in the nation trained to detect spotted lanternfly.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Programs Available to Help Farmers Reduce Energy Costs

Several free programs are available to help farmers and agribusinesses identify how they can reduce energy consumption and improve their bottom line. There are several programs in Pennsylvania that offer free technical assistance to identify potential energy savings and/or help applying for grants to make energy upgrades.

DEP / Penn State Extension

Pennsylvania Department of Environmental Protection and Penn State Extension have launched a new energy assistance program for agricultural producers in Pennsylvania.

Utility bill analyses will be provided free of charge upon request. A utility bill analysis involves review of 12 months of utility bills to determine simple ways for saving energy, to ensure taxes and fees are correct, and to help you make sense of the charges on your bills.

Farmers, take advantage of this free service now by contacting Ed Johnstonbaugh, Penn State Extension, at exj11@psu.edu.

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State News Briefs

PennTAP

Pennsylvania farmers can conserve energy, reduce waste, cut costs and increase profits for their farms or agribusinesses with a free on-site or virtual energy assessment from Penn State's Pennsylvania Technical Assistance Program.

Participants will receive detailed evaluations and advice as well as assistance with grant applications to fund equipment upgrades, all at no cost.

From livestock barns to grain drying systems to maple syrup production equipment, PennTAP advisors are equipped to assess all your agricultural systems. Contact PennTAP today to schedule an assessment or learn more about PennTAP services at penntap.psu.edu.

Northampton Community College Technology Applications Center

Farmers and other rural, small businesses can receive no-cost technical assistance to identify and assess renewable energy alternatives that can lead to cost-saving energy alternatives through a program at Northampton Community College.

The school's Emerging Technology Applications Center received a two-year grant from the U.S. Department of Agriculture to participate in the Rural Energy for America Program. Funding through this program will help provide technical assistance to eligible participants throughout Pennsylvania.

For more information and a determination of eligibility, contact cyoung@northampton.edu.

*From **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April/May 2021.*

Vendors Needed for Farmer's Markets

The following farmers markets are seeking produce vendors for 2021.

Lock Haven, Clinton County
- Main Street Parking Lot, 118 E Main Street, Lock Haven, PA 17745.
- Saturdays
- May 29 to September 25
- 9:00 a.m. and 12:00 p.m. The area is open for setup and tear down outside of those hours.
- Six (6) open-air booths will be provided in the lot for anyone to use. The booths must be reserved in advance for scheduling purposes. There is also extra space for tents and tables if the booths are not available.
- There is NO COST to reserve a spot at this market
- Contact Abbey Roberts at aroberts@lockhavenpa.gov, or 570-893-5903.

Western Pennsylvania Markets
- Davidsville, Somerset County.
- Thursdays
- May 27 to September (date to be determined)
- 3:00 to 6:00 p.m.
- No fees required.
- Contact Joyce at joyce@atlanticbb.net or 814-288-3587.

Midweek Market at SouthSide Works
- Wednesdays
- Bi-Weekly July 14 to October 6
- 3:00 to 7:00 p.m.
- Contact Carla Clipper at southsideworksmarket@gmail.com

Mt. Lebanon Uptown Market
- Saturdays
- May 8 to October 30
- 9:00 a.m. to 12:00 p.m.
- Contact Carla Clipper at mtlebanonevents@gmail.com

Bellvue Farmers' Market
- Wednesdays
- June 2 to October 27
- 3:00 to 7:00 p.m.
- Contact marketmanager@bellevuemarket.org

Baldwin Borough Farmers' Market
- Second and Fourth Saturdays
- June 12 to September 18
- 10:00 to 2:00 p.m.
- Contact Denise Maiden at denisemaiden@gmail.com

Other Markets Available

Brian Moyer with Penn State Extension has been contacted by several farmers markets that are looking for produce vendors. Growers interested in finding new market venues should contact Brian at 484-269-0229 or bfm3@psu.edu.

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2021 Educator's Ag Institute

Registration for the 2021 Educator's Ag Institute is now open! The Institute is an annual program to educate teachers about modern production agriculture to in turn enable them to incorporate that information into their classrooms for their students. It is sponsored by the Friends of Pennsylvania Agriculture Foundation affiliated with the Pennsylvania Farm Bureau. PVGA has annually supported the Institute program for over 25 years.

Once again, the Institute be will be offering this event in a virtual format with both live and on-demand options. Attendees will have the option to participate in sessions on a variety of topics. They can earn up to sixteen Act 48 hours. They will also receive an Educator's Resource Kit in June via mail with some lesson supplies and other goodies!

Additional information and registration is available on the Foundation's website at https://pfbfriends.com/ag-institute/.

Ag Institute Alumni Inspires School's New Ag Mission


Angela Eyth

Two years ago, Summit Elementary School teacher Angela Eyth came home from Educator's Ag Institute with a new mission for her classroom – connect her students to agriculture. Starting this fall, Summit Elementary will expand her mission to all students.

"Just think, this all started from my attending Ag Institute," Eyth said in a recent online interview. Educator's Ag Institute, a Pennsylvania Friends of Agriculture Foundation donor-supported program, helps educators learn how to incorporate lessons about agriculture into their classrooms. During the conference, there was a point Eyth became overwhelmed at the concept of building agriculture themes into her curriculum, but suddenly "I had a sense of calm come over me. I was not alone, there were all of these people and organizations ready to help."

Eyth went to work preparing for the 2019-2020 school year. She revamped lesson plans. She pulled in local farmers, Extension educators, and others to extend the experience with classroom visits. Her class adopted a calf, learned how to spin wool, built bluebird houses, and, together, pondered how they would improve a historical piece of farm equipment. Her classroom and hallway walls highlighted different agricultural themes. She developed an after-school agriculture program for interested students.

A curious buzz began to swirl around her unconventional projects. Butler Area School District administration staff began to inquire about her efforts. As the conversations continued, Assistant Superintendent Brian Slamecka and Student Engagement Coach Dave Andrews asked how she would expand her efforts. Eyth pointed to the school property. With about 16 acres, she said there was so much untapped potential to expand the educational experience for students – an outdoor classroom, pollinator garden, and a school garden were just a couple of ideas she quickly shared. She began to wonder, what were they planning?

In a later meeting, Andrews and Slamecka told Eyth the administration would like to take Summit Elementary to the next level. Their new goal is to develop a school experience committed to exposing students to agriculture, conservation, and environmental education through a community partnership.


Students help plant pollinator garden.

"Never in my wildest dreams did I think that they would go all in and then to make it this community partnership," Eyth said.

The school-wide program is called CAPS, or Community Agricultural Partnership at Summit. The goal of this program is to go beyond the books to cultivate lifelong learners and informed citizens with respect and appreciation for conservation, agriculture, and the outdoor environment, according to the program's mission statement. The school has established an advisory committee to create partnerships between the school and its community. The program was announced in February and approved by the school board in March.

The community will be a key piece of this effort, Eyth said. Several of these connections began after she returned home from Educator's Ag Institute and was asked to speak at the 2019 Butler County Farm Bureau fall meeting.

"I had a line of people waiting to talk to me to offer their help. Anything that you need, we're ready. Here's my card. Here's this. Here's that. It was phenomenal," she said.

The CAPS advisory committee has been meeting to prepare for this transition. The administration is procuring grants to grow the program.

"It's amazing when you sit down with community members and parents and then staff and you get such different ideas from different angles… It's been very eye-opening." The goal of the program builds on key agricultural concepts every year.

The pollinator garden construction has started. The district has applied for grants to fund the building of an outdoor learning space. The school is developing an animal agriculture experience – something students highlighted as an interesting point through the school survey process.

Eyth has been teaching for more than 20 years. She was encouraged by her school principal to attend Educator's Ag Institute in 2019, believing she would benefit from the experience. She credits that week for creating a renewed enthusiasm for education. She was named the 2020 Teacher of the Year by the Pennsylvania Farm Bureau Ag Promotion Committee. She will be attending the National Agriculture In the Classroom Conference in Iowa this summer, representing the foundation and Pennsylvania Farm Bureau.

Her children have blossomed through the agricultural experiences, even this year, although her programs had to adapt due to COVID-19 school guidelines.

She wants to connect the kids to what agriculture is and more importantly to the world around them and its opportunities. CAPS will help her do that.

"Agriculture is very fragile as an industry, nature can disrupt that at the drop of a hat. I think (farmers) don't get enough credit for what they do each and every day. We just take (farmers) for granted when we go to the store. I remember the first time one of my kids told me that, yes, chocolate milk comes from brown cows and I was horrified, but they were so serious and so very honest about it," she said. "By giving students experiences, it can make a difference."

New "Cover Crops and Soil Health" Video from SARE

The newest episode of SARE's "What is Sustainable Agriculture" animation series illustrates how producers can use cover crops to improve productivity and sustainability. In just a few short minutes, "Cover Crops and Soil Health" outlines how cover crops can build soil structure, protect water quality, suppress pests and improve a farm's bottom line.

Combining cover crops and reduced tillage can also help farmers:

- Manage soil nutrients
- Reduce erosion and compaction
- Improve water holding capacity and infiltration
- Reduce input costs
- Increase yields

"Cover Crops and Soil Health" is now available for viewing and sharing at https://www.sare.org/publications/what-is-sustainable-agriculture/cover-crops-and-soil-health/ and on YouTube at https://www.youtube.com/watch?v=PrQ_wu67ItM. Farmers, ranchers, educators and other agricultural professionals may download or embed the video without modification into websites or other noncommercial educational presentations. The entire "What is Sustainable Agriculture" series is also available on YouTube. This video series was produced through a collaboration of the Sustainable Agriculture Research and Education (SARE) program and Pixeldust Studios.

Current Issues in Pennsylvania Vegetables

Beth Gugino and Shelby Fleischer

General conditions as of May 14, 2021: After some significant rains this past week, it has been unseasonably cold across much of the state and especially in the northwest where there have been multiple freeze events over the past few weeks. In some cases, the colder weather has delayed planting by both growers and homeowners leading to overgrown transplants for both the field and for sale.

ONIONS and other ALLIUMS

Marks on ramps made by ALM female with her ovipositor, for egg-laying, or wounding that attracts more ALM. Photo credit: Rebecca Kutys.

Emergence of the spring adults from overwintering pupa of **Alllium leafminer** (ALM) started in mid- to late March in southeast PA and continued into mid-April in cooler areas of the state. Adult flight occurs over about 5-7 weeks. Therefore, we expect the first flight **(ALM)** to be over soon - around May 20 in the warmer areas, and maybe extending another week in cooler areas. Growers are being advised that they can discontinue applying row covers or insecticides targeting adults by Memorial Day. Also, onions planted towards the tail end of the adult flight will have escaped significant damage: those very young leaves will become the scale leaves surrounding the bulb at harvest, and ALM trapped in those scale leaves rarely survive, or will be sloughed off during harvesting and packing. Most ALM are now in the larval stage, mining the leaves. Scout fields for oviposition marks and use systemic or translaminar insecticides to target early larvae if necessary. The most consistent effective op-

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VEGETABLE PRODUCTION

Current Issues in Pennsylvania Vegetables *continued from page 9*

tions include the neonic dinotefuran (Scorpion), the diamide cyantraniliprole (Exirel, Verimark), and spinetoram (Radiant); also the OCIA-labelled option spinosad (Entrust) performed well in several trials. See this for a comparison of 14 ai options relevant to IPM and certified organic production. The larval stage will occur for about 3 weeks at ~60-degrees, and a bit longer under cooler temperatures. There is a new phenology model for ALM that can be run for select weather stations through the NEWA system and selecting 32 Fahrenheit for the base temperature. We are estimating spring emergence of adults will just begin at about 350 degree-days above this base temperature.

We sometimes get asked if ALM will infest the agroforestry crop ramps. Yes, we have confirmation of ALM infestation of ramps in PA.

HIGH TUNNELS

The cooler weather and high relative humidity in high tunnels and greenhouses is making conditions perfect for **Botrytis/Gray mold** to develop on most crops. Botrytis is favored by cool temperatures and the high relative humidity that comes from poor air circulation due to overcrowding of plant material. This can either result from tight plant spacing or crop over fertilization leading to lush crop canopies that limit air movement and promote leaf wetness. It commonly starts on damaged plant tissue or senescing flowers and then progresses onto the fruit. Fungicides such as Decree, Botran, and Scala can limit disease spread and are registered for greenhouse/high tunnel use on certain commonly grown greenhouse vegetable crops. Improving air circulation is also beneficial.

Zonate brown necrotic lesions typical of Botrytis on tomato in a high tunnel. Photo credit: Beth Gugino.

Mite and thrips damage have also been observed in greenhouse crops. Keep in mind that thrips can vector viruses such as tomato spotted wilt virus. It is especially important not to comingle vegetable transplants with ornamental transplants or hanging baskets which can often be the source of thrips entry to the farm.

Dense gray sporulation caused by Botrytis on high tunnel grown zucchini fruit. Photo credit: Leah Fronk.

Crop nutritional issues have been observed in a number of high tunnels and greenhouses especially in hydroponic production causing plants in some cased to be severely stunted. It is important to know what nutrients are being applied at what rates. Water quality in terms of pH and soluble salts is also important for optimizing nutrient availability and minimizing nutritional stress. Plant tissue testing can be an important source of information during the season to help adjust in-season fertility. For a tutorial on plant nutrition in hydroponic systems check out Hydroponic Systems and Principles of Plant Nutrition: Essential Nutrients, Function, Deficiency, and Excess. For those growing in native soils check out a series of articles was recently written by Elsa Sánchez and Tom Ford based on soil samples from the high tunnels of 27 growers. These articles will help growers navigate the topics of soil chemical properties and crop health and include High Tunnel Soil Health Test Report: Soil pH, Soluble Salt Levels, Soil Nutrient Levels, and Organic Matter and Cation Exchange Capacity.

SPECIAL NOTE: Pesticide Applications in Enclosed Spaces

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

Common situations that would still be considered enclosed spaces:

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

Common situations that would not be considered enclosed spaces:

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

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

RESOURCES FOR STAY UP TO DATE WITH THE LATEST INFORMATION

- **1-800-PENN-IPM** hotline had expanded its menu options starting with the 2020 production season. Dial 1-800-PENN-IPM (1-800-736-6476) and select from a range of crop groups and topics from vegetables (onion, tomato/potato, sweet corn, vine crops), small fruit, tree fruit, to greenhouse IPM and hear weekly updated 90 second voice messages with the latest information on crop, pest and disease management to help you through the growing season.
- **Sign-up with Penn State Extension** to receive the latest news and information on vegetable and small fruit crop production as well as pest and disease management either electronically or by USPS (1-877-345-0691).

- **Cucurbit downy mildew alerts** can be obtained by email or text message by signing up at https://cdm.ipmpipe.org/alerts/. You can specify the distance from your farm for which you would like to receive reports.
- **The 2020-2021 Mid-Atlantic Fruit and Vegetable Production Recommendations** contains the latest information to help commercial vegetable and strawberry growers in the mid-Atlantic regional make production and pest management decisions. The hardcopy can be purchased either online or by calling 1-877-345-0691. Individual sections are also available for download here. This publication will now be updated every other year so the next update will be in 2022.
- **Penn State Extension Informational Kiosks** are available at many of the produce auctions across the state. Throughout the season they will provide both education material as well as timely pest and disease forecasting information. Three additional locations are being added this year.

Dr. Gugino is with the Dept. of Plant Pathology and Environmental Microbiology and Dr. Fleischer is with the Dept. of Entomology, both at Penn State Univ. From Penn State Extension, https://extension.psu.edu/2021-current-issues-for-pa-vegetable-and-berry-crops-may-14, May 14, 2021.

New Rootstock Protects Watermelons Against Fusarium and Root Knot Nematodes

Gordon Johnson

Delmarva watermelon growers have challenges from two soil borne pests, Fusarium Wilt, and Southern Root Knot nematodes. Current management practices include long rotations with non-hosts, soil applied fungicides and soil applied nematicides.

There is now another tool that growers can use to manage these pests where both pathogens are present — grafting watermelon plants onto "Carolina Strongback' rootstock.

Carolina Strongback was bred by USDA-ARS scientists and was tested by Clemson University researchers in South Carolina. It is a cross between several wild watermelon citron lines and was released in 2019. According to the USDA-ARS "Selected for its grafting qualities and seed production, Carolina Strongback material can be used by seed companies, vegetable grafting companies and watermelon growers as a rootstock for growing susceptible watermelon cultivars in soils infested by the watermelon Fusarium wilt pathogen (races 1 and 2) and (southern) root-knot nematodes".

This rootstock was used in 2020 with grafted seedless watermelons in many locations and performed well. We expect increased availability in the future.

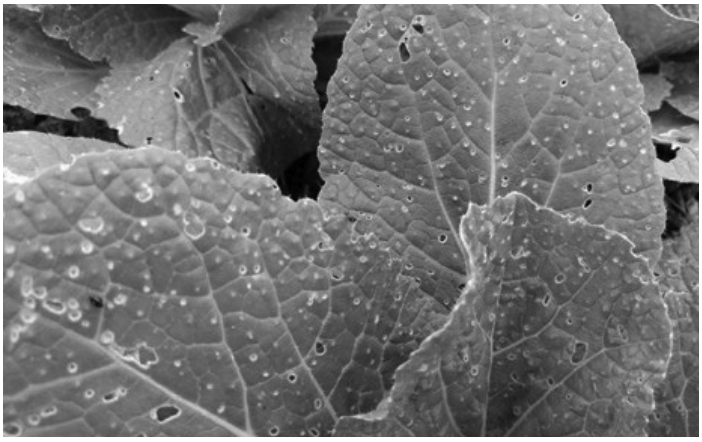
*Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 29, Issue 7, May 7, 2021.*

VEGETABLE PRODUCTION

Flea Beetle in Spring Brassica Plantings

Leah Fronk

When scouting for insects this spring, be sure to keep your eyes open for flea beetles.



Flea beetle damage on Napa cabbage. Photo: Leah Fronk, Penn State

These insects are general feeders, meaning they can frequently be found on the foliage of vegetables and garden plants where the damage resembles a shot-hole effect as shown in the photo. While young brassica seedlings and transplants are susceptible to their feeding, solanaceous crops such as tobacco, potato, and eggplant are often damaged by flea beetles as well. Keep in mind that the brassica family of plants is also referred to as cruciferous or cole crops. This large plant family includes many food crops and weeds such as cabbage, broccoli, cauliflower, brussels sprouts, and kale as well as collards, mustard greens, radish, and kohlrabi.

The emergence of the adult flea beetles takes place in mid-to-late spring when the temperatures begin to warm up. After the adults feed for several weeks, they lay eggs in the soil near desirable host plants. The larva then feeds on the roots for about 30 days, pupate and then emerge as the second generation of adults. Depending on the weather and species of flea beetle, you may see 1–4 generations in a season. Flea beetles overwinter as adults in the soil, protected by weeds and plant debris.

Adult flea beetles are about 1/8" long and feed on emerged plant tissues above the soil. This is the stage of flea beetle you will detect while scouting. Flea beetle larvae feed under the soil on roots. While the larval stage does not often cause economic damage to brassica crops, the adults can cause severe damage if left unchecked.

To monitor for flea beetles, you may use sticky traps to aid in detection, but visual inspection works just as well. Thresholds for flea beetles are one adult beetle per transplant, or 5 beetles per 10 plants in the cotyledon stage (cotyledons are the first "seed leaves" of your plant). If your flea beetle numbers are within the threshold, treatment is necessary.

Flea Beetle Management

Before considering a pesticide application consider the following practices that you can implement to decrease flea beetle populations.

Crop rotation

While crop rotations are not as effective for flea beetles as some other insects because of their mobility, avoid planting brassicas after potatoes because potato tuber flea beetle populations are likely to be high.

Sanitation

Eliminating crop debris and weed hosts can help to suppress populations of flea beetle. Especially troublesome weeds include those in the brassica family – wild mustard, wild radish, and yellow rocket. You may even observe flea beetle damage to weed hosts before it is apparent on the crop.

Planting date

Getting seed and plants out early may be to your advantage with flea beetles. Row covers and plastic mulches will hasten plant development and plant maturity before peak insect emergence. As brassica plants grow, they will better tolerate flea beetle feeding. Seedling and small transplants are most susceptible. It is no secret that spring brassicas face more insect pressure than fall brassica plantings. In summer and fall, the soil is warmer, and plants get off to a better start much more quickly. However, depending on your market, spring brassicas may be a necessity.

Row covers

As mentioned previously, floating row covers are a physical control method for flea beetles. Place the row cover on plants before flea beetles emerge. Keep in mind that since flea beetles overwinter in the soil, there may be an emergence of the adult beetles underneath the cover. However, a well-secured row cover will prevent already-emerged flea beetles from finding your crop.

Other physical methods

While hand-picking can be employed for some insect species, flea beetles are equipped with well-developed hind legs that allow them to jump like a flea when disturbed. Hand-picking is not an effective method of control for flea beetles.

Since the growing season has already begun, it may be too late to implement some cultural controls. If you find yourself in the position of high flea beetle numbers, you will want to treat your crop with an approved product. Below is a list of products labeled for flea beetle management in Pennsylvania. It is not an exhaustive list. Please refer to the Mid-Atlantic Commercial Vegetable Production Recommendations for additional information.

Brand Name	Active Ingredient	Group	PHI
Sevin XLR Plus	carbaryl	1A	14-Mar
Brigade*, Capture*	bifenthrin	3A	7, AP
Lambda-cy 1 EC*, Warrior II*	lambda-cypermethrin	3A	1
Mustang-Maxx*	zeta-cypermethrin	3A	1
Hero*	zeta-cyperpermethrin + bifenthrin	3A	7
Pyganic EC 1.4**	pyrethrin	3A	0
Assail	acetamiprid	4A	3-Jul
Entrust SC**	spinsosad	5	1
Ecozin Plus 1.2% ME**, Molt-X**	azadirachtin	UN	0
Mycotrol ESO**, BotaniGard 22WP**	*Beauvaria bassiana*	UN	0
Surround WP Crop Protectant**	Kaolin clay	UN	0

*Restricted-use products that require an applicator license, **Organic pesticide products, please check with your certifier prior to use.

It is worth mentioning that there are several biological controls available for flea beetle. Generalist predatory insects such as lacewing larva, big-eyed bugs, and damsel bugs have been known to feed on adult stages of flea beetle. Entomopathogenic nematodes are parasitic, unsegmented worms that feed on insects. They live in the soil and can suppress populations of flea beetle by feeding on the larva.

Another biological control listed in the table above is *Beauvaria bassiana*. This naturally occurring soil fungus infects susceptible insects with white muscadine disease. The *Beauveraia bassiana* strains GHA and ATCC 74040 are effective in controlling flea beetles, and some formulations are organically approved and can be purchased commercially in Pennsylvania. Insecticides containing *Beauveria bassiana* should be applied in the evening because sunlight may kill these spores[1].

[1]Parker, Joyce E, Snyder, William E. 2017. Managing Cruciferous and Solanaceous Flea Beetles in Organic Farming Systems [online].

Ms. Fronk is an Extension Educator with Penn State Extension in Juniata County. From Penn State Extension, https://extension.psu.edu/flea-beetle-in-spring-brassica-plantings, April 27, 2021.

Understanding Protectant Fungicides

Andrew Wyenandt

Protectant (contact) fungicides, such as the inorganics (copper, FRAC group M01) and sulfur (FRAC code M02); the dithiocarbamates (mancozeb, M03), phthalimides (Captan, M04), and chloronitriles (chlorothalonil, M05) are fungicides which have a low chance for fungicide resistance to develop. Protectant fungicides typically offer broad spectrum control for many different pathogens.

Why wouldn't fungi develop resistance to protectant fungicides? Protectant fungicides are used all the time, often in a weekly manner throughout much of the growing season.

The answer is in their modes-of-action. Protectant fungicides have modes-of-action that prevent fungal development in different manners. In inorganic compounds, sulfur (M02) prevents fungal growth (i.e., spore germination) by disrupting electron transport in the mitochondria. Coppers (M01), on the other hand, cause non-specific denaturation of proteins. Importantly, the overuse of copper on certain diseases on can lead to copper resistance development (e.g., copper use and bacterial leaf spot in tomato and pepper). Chlorothalonil (M05) inactivates amino acids, proteins, and enzymes by combining with thiol (sulfur) groups. In all cases, a protectant fungicide's chemistry disrupts fungal growth and development either non-specifically or in multiple manners. Because of this, there is a much lower chance for fungi to develop resistance to them.

Protectant fungicides are contact fungicides, meaning they must be present on the leaf surface prior to the arrival of the fungus and must then come into direct contact with the fungus. Protectant fungicides can be redistributed on the leaf surface with rainfall or overhead irrigation, but can also be washed off by too much of either. Remember, that with protectant fungicides, any new growth is unprotected until the next protectant fungicide is applied, in other words, protectant fungicides are not systemic and do not have translaminar activity like some of the newer fungicide chemistries. For some diseases its difficult to get protectant fungicides where they are needed the most – on the undersides of leaves. Thus, tank mixing protectant fungicides with systemic fungicides or fungicides with translaminar activity is important when disease pressure is high.

Protectant fungicides should be tank-mixed with fungicides with high risks for resistance development. Protectant fungicides used in this manner will help slow (or reduce the chances for) fungicide resistance development on your farm. In any case, it's best to always follow the label and tank mix protectants with high risk fungicides when suggested or required to do so.

*Dr. Wyenandt is the Vegetable Pathologist for Rutgers Cooperative Extension. From the **Plant and Pest Advisory**, Rutgers Cooperative Extension, https://plant-pest-advisory.rutgers.edu/growers-guide-to-understanding-the-protectant-fungicides-frac-groups-m1-m11-2-3/, March 10, 2021.*

VEGETABLE PRODUCTION

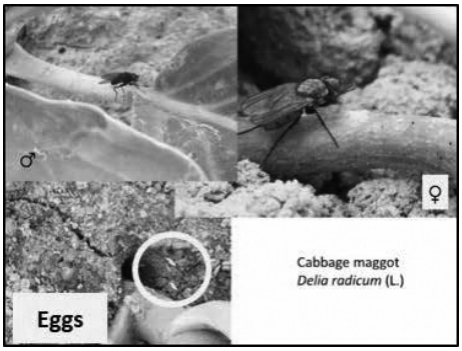
Tips and Tricks for Managing Insect Pests of Brassicas

Dan Gilrein - Cornell Cooperative Extension, Ana Legrand - UConn Extension, Sue Scheufele - UMass Extension, Becky Sideman - UNH Extension, and Faruque Zaman - Cornell Cooperative Extension

Brassicas are among the first crops to be planted out in the field in the spring, and brassica insect pests are not far behind. Cabbage root maggot flight has started in most of Massachusetts as of second week of April, imported cabbageworm butterflies are flying, and flea beetles will soon be emerging from their overwintering sites. This fact sheet, created by the Brassica Pest Collaborative, a group of Extension educators from UMass, UConn, UNH, and Cornell Cooperative Extension of Suffolk County, is an overview of brassica insect pest management for both organic and conventional producers.

Cabbage Root Maggot

- Rotate locations of spring and fall brassica plantings within and between seasons.
- Predict CRM emergence using indicator plants (flowering yellow rocket), NEWA model, or other monitoring tools.
- Check for signs of infestation: Look at the base of the plants for CRM eggs and check roots for damage.
- Control: Look for alternatives to chlorpyrifos. Verimark is a good choice, and other options are available including Entrust (OMRI-listed) for some crops (check labels, regional restrictions apply).
- Grow your own transplants and treat before setting out or during hardening off.
- Exclusion netting can be used for small-scale or organic producers. It will protect from cabbage maggot and other insects—cabbage and other waxy crops can be grown on black plastic mulch for weed control under exclusion netting.
- Mature plants can withstand some level of root damage.



Photos: F. Zaman, Cornell

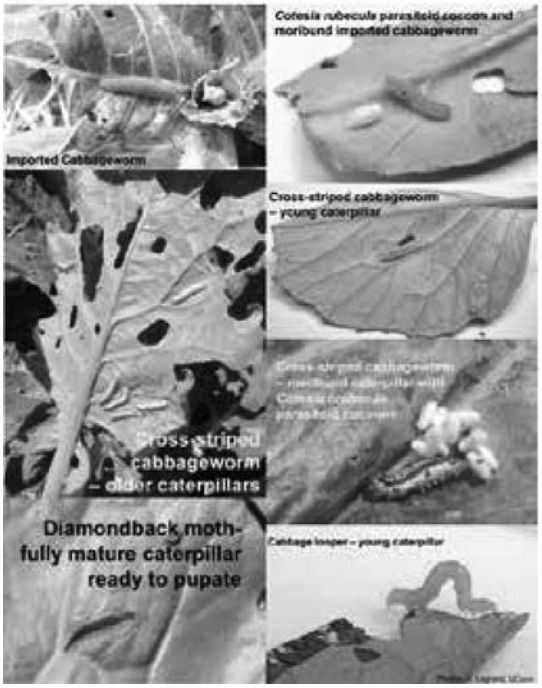
Flea Beetle

See also article on page 12.

- Rotate crop locations, moving spring crops away from fall crops in order to leave FB behind.
- Use row covers or insect netting in spring and/or for direct-seeded crops.
- Grow larger transplants, which can tolerate more damage.
- Use Surround to protect waxy seedlings during establishment. Mix well, include an adjuvant, and re-apply at least weekly and after rain.
- Conventional: many effective options including diamides (e.g. Exirel, Harvanta), neonicotinoids (e.g. Admire, Platinum, Venom), Sevin XLR, Torac, and pyrethroids.
- Organic: spinsoad (Entrust) is the most effective organic treatment. Pyganic is not effective alone.
- Improve spray coverage: Use an adjuvant (wetting agent or sticker), hollow cone nozzles, and enough spray volume to cover plants.
- Re-apply insecticides as long as FB are present during the susceptible period for that crop (first 2-4 weeks for transplanted waxy crops, or for the life of non-waxy crops).
- Till under residues quickly after harvest, and eradicate weed hosts.
- Use mustard trap crops (or use highly attractive cash crops e.g. bok choy as traps) to reduce spraying. Keep the trap crop healthy and spray the trap crop regularly to be successful.

Caterpillars

- Identify the caterpillar species present to determine proper threshold level and inform choice of insecticide.
- Grow your own transplants to avoid introducing resistant diamondback moths.
- For small-scale production or hardening off transplants, exclusion netting works great to keep out caterpillars and other pests.
- Include an adjuvant (wetting agent or sticker) to keep spray materials on foliage.
- Do as much as possible to improve spray coverage, especially to get material under foliage and in center growth.
- Start with Bt materials – inexpensive and generally sufficiently effective – rotating to others as needed for larger loopers and other pests like FB.
- Rotate Bt subspecies used (Bt kurstaki or Bt aizawai) for resistance management.
- Check pesticide side effects on beneficial insects like predators and parasitoids. Use selective pesticides.
- Scout weekly, if possible, to re-assess pest status and spray efficacy. Look for eggs (looper, ICW mainly) as well as larvae, to prevent feeding damage from large larvae.



Photos: A. Legrand, Univ. of Connecticut

VEGETABLE PRODUCTION

Cabbage Aphid

- Rotate crop locations, moving spring crops away from fall crops in order to leave CA behind.
- Scout regularly for signs of the very first aphids, ESPECIALLY if there were high populations the previous year. Watch for patchy leaf yellowing!
- Rogue out any plants that are severely infested.
- Take action when aphids are first observed: treat with insecticides when 10% or more of the plants have at least one aphid. For organic growers, options include azadirachtin, pyrethrum, and insecticidal soaps, alone or in tank-mixes or rotations. There are many effective conventional insecticide options: https://nevegetable.org/crops/insect-control-3
- After treating, continue scouting on a weekly basis and treating whenever the threshold is exceeded.
- Do as much as possible to improve spray coverage, especially to get material under foliage and in center growth, and include an adjuvant (wetting agent or sticker).
- Incorporate crop residues thoroughly at the end of the season or in very early spring.

CA on Brussels sprouts (Photo: UMass) and leaf chlorosis caused by CA feeding on underside of leaf (Photo: R. Sideman, UNH)

Common Themes

- Rotate spring from fall plantings, and fall from spring plantings—leave your worries behind! (for CRM, FB, CA—not caterpillars)
- Scout early and often in order to catch problems early, get a proper ID, and keep up with continuous pests. (FB, caterpillars, CA)
- Improve spray coverage: Hollow cone nozzles are recommended for insecticide and fungicide applications. Consider adding drop nozzles for large crops like Brussels sprouts. Always use a spreader and/or sticker to keep spray materials on foliage. (FB, caterpillars, CA)
- Continue treating as long as thresholds are exceeded—one spray will not keep all the caterpillars, or aphids, or flea beetles away.
- Till under residues as soon as possible. Mow if you cannot till in order to start the breakdown process.

Ammi majus insectary planting in a brassica field. Photo: A. Legrand, Univ. of Connecticut

Alternatives & Frequent Questions

- Use insectary flowers to attract predators and parasitoids: alyssum, cilantro, dill, and Ammi majus attract both types of biocontrol organisms in New England.
- Mulches may interfere with insect host finding and deter activity and egg-laying of root maggots, flea beetles, and cabbage aphids.
- Beneficial nematodes may kill flea beetle larvae, but will not have a direct impact on damage, as adult beetles will move in from other fields.

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under subaward number LNE18-365

Mr. Gilrein is with Cornell Cooperative Extension, Ms. Legrand is with the Univ. of Connecticut Extension, Ms. Scheufele is with the Univ. of Massachusetts Extension, Ms. Sideman is with the Univ. Extension, and Dr. Zaman is with Cornell Cooperative Extension. ***From the Vegetable Notes for Vegetable Farmers*** *in Massachusetts, Univ. of Mass. Extension, Vol 33., No. 4, April 15, 2021*

VEGETABLE PRODUCTION

New Crop Rotation Recommendations for Swede Midge

Christy Hoepting and Sarah Vande Brake

Introduction

Swede midge is difficult to control on small farms

Swede midge (Contarinia nasturtii) is an invasive insect that can seriously damage plants in the family Brassicaceae, which includes broccoli, cauliflower, cabbage, kohlrabi, and kale. Larval feeding on brassica crops results in distorted plant growth, corky scarring, and/or blind heads, which can reduce marketable yield and quality (Fig. 1). Swede midge control is challenging on small-scale and organic farms, where season-long production of brassica crops in close proximity is common. This continuous supply of host plants allows swede midge populations to explode. Research shows that economic damage to crops can be avoided by "crashing" the swede midge population. New crop rotation recommendations provide a feasible population management strategy for some small farms.

Life cycle

In New York, swede midge has 4-5 overlapping generations that are active from mid-May to late-October. Each spring, the tiny (2 mm) gnat-like adult flies emerge from overwintered pupae in the soil. Females have 3 days to find a mate and then a suitable host on which to lay their microscopic eggs. Eggs hatch within 2-8 days and then the larvae (2-3 mm) feed deep within the growing tips of brassica plants for 7-26 days before dropping to the soil, where they pupate for 7-49 days or overwinter. About 2% of overwintering pupae remain in the soil for at least 2 years.

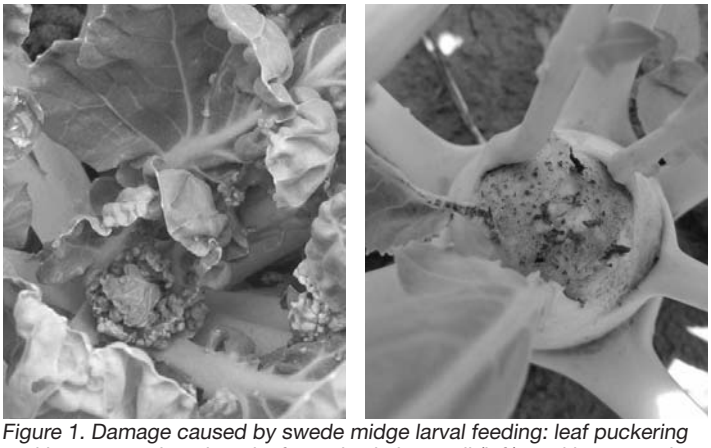


Figure 1. Damage caused by swede midge larval feeding: leaf puckering and brown scarring along leaf margins in broccoli (left), and brown corky scarring deeming kohlrabi head unmarketable (right).
Photos: C. Hoepting, CCE Cornell Vegetable Program

Far and Long Crop Rotation Options

Preliminary crop rotation recommendations

Preliminary crop rotation recommendations advised growers to rotate away from brassica crops by at least 3,000 feet for a minimum of 3 years. This was a conservative recommendation based on the knowledge that swede midge are weak fliers and can persist in soil for at least 2 years. Implementing such far and long spatiotemporal rotations is impractical for most small farms.

To examine whether a reduced spatiotemporal rotation scheme could effectively mitigate swede midge damage, Cornell Vegetable Program researchers conducted an extensive project, which monitored swede midge populations and crop damage on seven small-scale organic farms in New York from 2015 to 2017. This work resulted in new, less restrictive crop rotation recommendations that center on reducing economic damage by depriving adult swede midge of susceptible host plants during peak periods of activity.

New spatial (far) crop rotation recommendations

In the monitoring project, ~500 feet between secluded fields was enough to prevent swede midge that emerged from an infested field from finding brassicas in an uninfested field. Swede midge generally cannot fly long distances or cross over large physical barriers, so it is important that fields are separated by barriers such as wooded strips. Hedgerows and fences are not an adequate physical barrier. Note that in an open field (e.g. 8-12 acre), 500 feet between an infested site and a new brassica planting is not enough to prevent infestation of the new planting.

CROP ROTATION	RECOMMENDATIONS	
	OLD (for non-secluded fields)	NEW (for secluded fields)
Far	**Minimum: 3,000 feet** between brassica crops	**~500 feet Caveat: Fields must be separated by a substantial barrier such as woods**
Long	**Minimum: 3 years** between brassica crops	**Minimum: 2.5 to 3 months** (= no brassicas from May to mid-July)

New temporal (long) crop rotation recommendations

In New York, peak emergence of adult swede midge from overwintered pupae occurs from mid-May to late June. Population monitoring indicates that there are usually two emergence peaks, after which only very low levels of overwintering adults will continue to emerge (Fig. 2a & b). Therefore, a minimum 2.5 to 3 month gap in brassica crop production from May through July can be highly effective. This means that the same field may be cropped to brassicas in consecutive years, but enough time must be given to crash the swede midge population in the spring. Wait until mid-July when swede midge spring emergence has subsided to plant a brassica crop in such a field.

Largest spring emergence is expected following a brassica crop that was infested with swede midge during the previous fall. Heavy spring emergence may also occur following a brassica planting that was infested with swede midge during the previous summer. Extent of spring emergence following an infested planting during the previous spring is unknown, but it is expected to be minimal, because swede midge would likely have left the site in search of another brassica crop.

The new crop rotation recommendations will not eliminate swede midge from your farm, but can prevent swede midge populations from building up to economically damaging levels.

Conditions for new crop rotation recommendations

- Have multiple secluded fields, ideally separated by wooded areas. 500 feet is not far enough in an open area (e.g. 8-12 acre field)
- Ensure brassica transplants are free from swede midge infestation.
- Combine crop rotation with timely post-harvest crop destruction to prevent swede midge populations from building.
- Avoid brassica cover crops such as mustard when rotating away from brassicas.

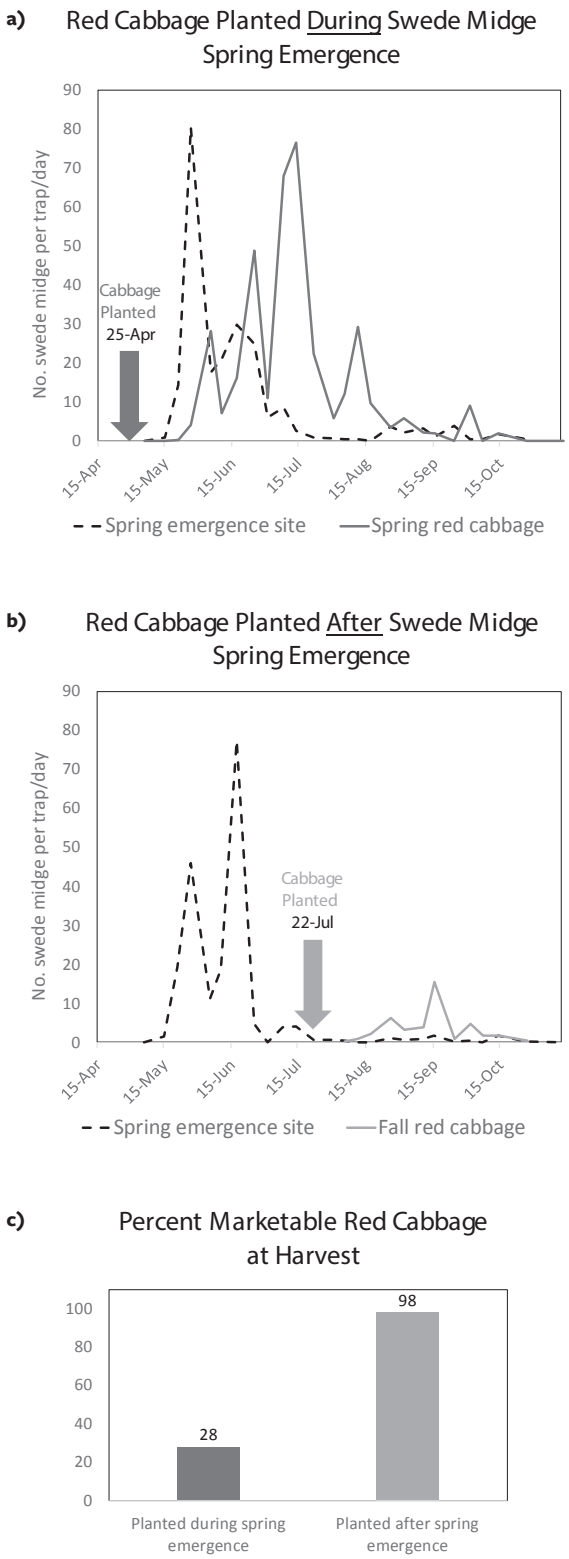


Figure 2. Effects of planting red cabbage during (a) and after (b) spring emergence of swede midge on swede midge population and subsequent marketability of the crop (c). Waiting to plant red cabbage until spring emergence had subsided improved marketability by 70%.

Continued on page 18

VEGETABLE PRODUCTION

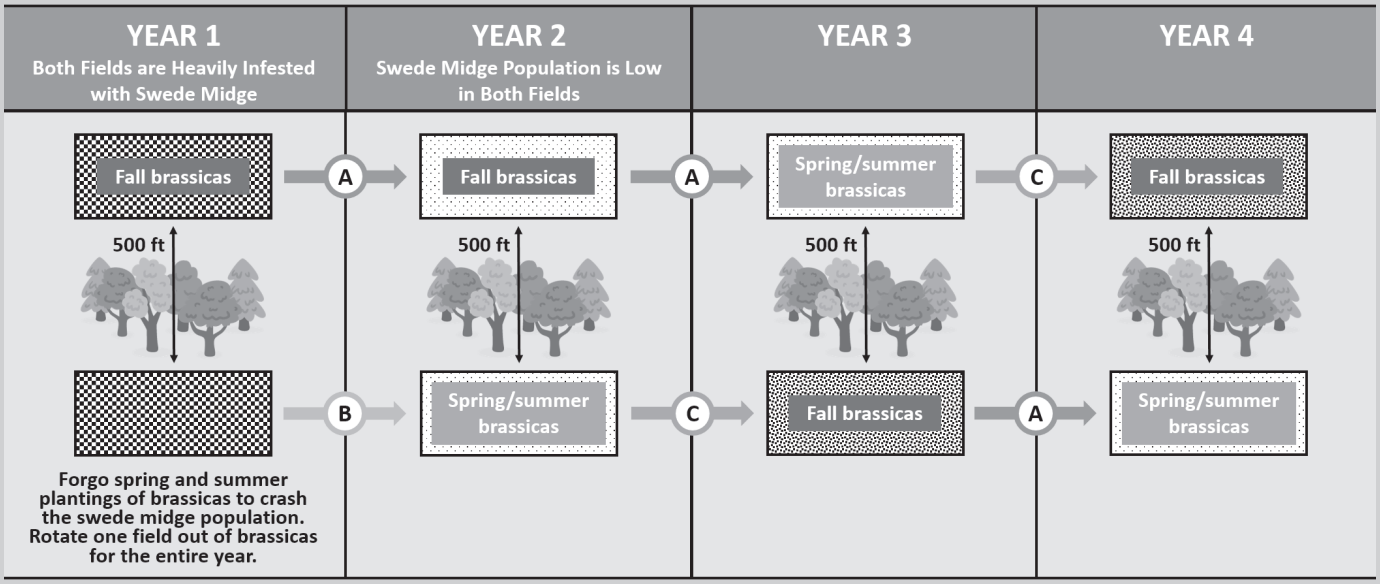
New Crop Rotation Recommendations for Swede Midge

continued from page 17

EXAMPLE CROP ROTATION USING NEW RECOMMENDATIONS

In this example, we begin with a farm that has **two secluded fields separated by a 500 foot wooded area**, both of which are heavily infested with swede midge. Heavy spring emergence is expected in both fields. After rotating away from spring and summer brassica plantings for one year, the farm may resume season-long brassica production by rotating between spring and summer plantings in one field and fall plantings in the other.

If two secluded sites are not available, two farms could consider collaborating by swapping ground in order to implement rotation of brassica plantings. If susceptible brassicas must be planted in a heavily infested site, insect exclusion netting may be an option. More information on insect exclusion netting can be found in the online reports listed at the end of this factsheet.



Key

- **Field with high swede midge pressure** (major crop losses occur in susceptible brassicas)
- **Field with moderate swede midge pressure** (some crop losses occur in susceptible brassicas)
- **Field with low swede midge pressure** (no damage or minor damage occurs)
- Wait until after spring emergence subsides to plant fall brassicas no earlier than mid-July, and monitor your fall plantings in case unexpected damage does occur.
- Plant spring and summer brassicas in field with lowest swede midge pressure.
- (A) Swede midge pressure is expected to be low following fall brassicas that were planted after spring emergence.
- (B) In absence of brassicas, swede midge population crashes to low levels.
- (C) Planting spring and summer brassicas in the same field will allow the swede midge population to build to moderate levels. Do not plant brassicas in the same field season-long.

When Crop Rotation is Not An Option

The new crop rotation recommendations will not work for every farm. However, there are still other management strategies to consider. Even if you do not have secluded fields separated by 500 feet, growing only fall brassicas on your farm can reduce pest pressure by disrupting the swede midge population cycle (see crop rotation example). Insect exclusion netting is extremely effective and economically viable when swede midge pressure is high in a high-value brassica crop. Additionally, swede midge has relative preferences among brassica crops, and less-preferred crops consistently suffer lower levels of damage. Brassica crops in order of preference by swede midge:

MOST Preferred:
Red Russian kale
Broccoli
Collards
Other Russian kales
Romanesco
Cauliflower
Kohlrabi
Brussels sprouts
Cabbage
(Once cabbage heads, it
becomes least preferred)
Curly and Lacinato kales
Turnips/Radishes
Bok choy
Savoy cabbage
Chinese cabbage
Least Preferred

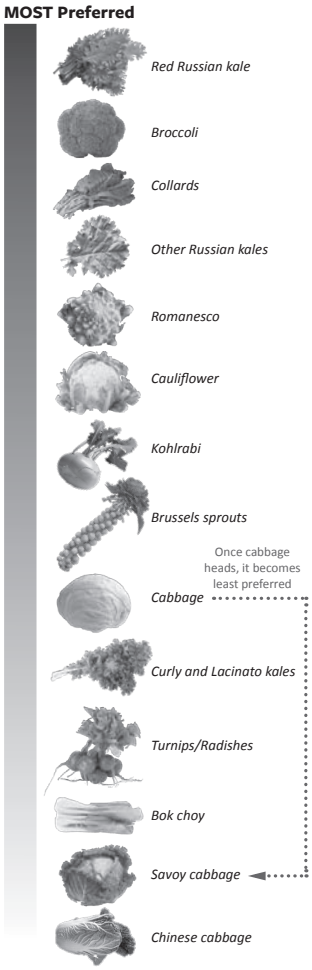


Figure 3. Relative preference of different brassica crops by swede midge in order from most preferred at top to least preferred at bottom.

After three years of monitoring swede midge populations on small organic farms, it became obvious that broccoli and Red Russian kale are the most preferred hosts. Repeatedly, swede midge sought out these crops over all other brassica crops within a contiguous 4 to 12 acre area. Also, swede midge tended to remain in broccoli and Red Russian kale as long as these crops were producing new growing points. Therefore, know that if you plant broccoli or Red Russian kale under moderate or high swede midge pressure, these crops will very likely suffer economic levels of damage.

Alternatively, Chinese cabbage, savoy cabbage, and Bok choy consistently were not damaged in fields with high swede midge pressure. Curly kales, Lacinato kales, turnips, radishes and rutabagas also appeared to be less preferred by swede midge, but could be infested when a more preferred crop was unavailable. More tolerant crops could potentially withstand higher levels of swede midge pressure than susceptible crops, reducing economic losses.

In general, red or purple varieties, such as red cabbage or purple kale, are more preferred by swede midge than green varieties. Also, once the growing points become inaccessible, such as when cabbage is heading, these crops become least preferred by swede midge.

When to Switch from Black to White Plastic Mulch

Gordon Johnson

High temperatures (90°F or higher) coupled with clear skies can lead to heat buildup on the surface of black plastic mulched soils. We have found temperatures of over 140°F at the surface of black plastic mulch. This can cause losses with transplants because stems near the mulch are damaged by the high heat. In crops seeded through the black mulch, germination is often reduced, and if plants do emerge, they can be killed by the excess heat. Another problem is high soil temperatures under black mulch which can lead to fruit quality issues in tomatoes and peppers. In onions, black mulch can cause damage to bulbs due to excess heat.

One solution is to reduce bed temperatures by using white mulches. White mulches can lower bed temperature by up to 20°F. Use of white mulch increases transplant survival and increases germination and survival of seeded crops. The cooler soil also can increase root function and reduce fruit disorders such as white tissue, blotchy ripening and yellow shoulders in tomatoes and blossom end rot in tomatoes and peppers.

In onions, cutting the black mulch in mid-June as bulbs are increasing size has been shown reduce to reduce bulb damage.

In the past, a rule of thumb has been to switch to white mulch in the middle of June when days are longer and air temperatures are higher for longer periods of time. White mulch should also be used for crops planted in July and the first half of August.

The most common mulch used is white on black. The black side reduces weed germination, and the white top reflects solar radiation this cooling the surface and the soil beneath.

Is there an advantage to switching earlier? Up to the middle of May, black plastic (or other soil heating colors) should be the preferred mulch to get warm season vegetable plants off to a good start when soil temperatures can be variable and bed heating improves crop performance. The second half of May can see some very hot weather as can the beginning of June, but this varies from season to season. Past research has shown no benefits to using white mulch in this period and often reduced crop performance in warm season crops such as watermelons. If long range forecasts are for warmer than normal temperatures, laying white or reflective plastic earlier in June may be advised for sensitive crops.

White mulches have also shown benefits in spring planted cool season crops such as broccoli, lettuce, onions, and day neutral strawberries planted in April.

*Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 29, Issue 9, May 21, 2021.*

For more information

Cornell University's website Swede Midge Information Center for the U.S. http://web.entomology.cornell.edu/shelton/swede-midge/

Hoepting, C.A. 2015. Optimizing management of a new invasive species, swede midge, on small-scale organic farms. Final Report for Northeast Sustainable Agriculture Research and Extension (NESARE) Partnership project ONE15-237. Online: https://projects.sare.org/project-reports/one15-237/.

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Ms. Hoepting and Vande Brake are with Cornell Cooperative Extension Vegetable Program. From IPM Vegetable Fact Sheet, Cornell Cooperative Extension, https://ecommons.cornell.edu/handle/1813/70145, May 2020.

BERRY PRODUCTION

Current Issues with Pennsylvania Berries

Kathleen Demchak and Margarita Lopez-Uribe

As with last year, **frost protection** of strawberry blossoms has been a challenge for many growers given the wind that accompanied our cold temperatures. While some blossoms have been lost, most growers are reporting additional bloom that is expected to result in a substantial crop, especially considering that fruit size from later blossoms will increase in size to at least partially compensate for the damage.

Unusual coloration of blueberry plants due to cold temperatures. Photo credit: Kathy Demchak.

Blueberry growers in cooler parts of the state are reporting **unusual coloration to new blueberry leaves and emerging blossoms**; this is thought to be a response to the combination of especially cold temperatures this spring with the stage of plant growth. There are varietal differences, with 'Duke', 'Reka', and 'Superior' showing especially deep reddish or copper leaf color, though all varieties are showing odd coloration to some extent.

Mid-season varieties (like Bluecrop) are in peak bloom in central Pennsylvania. Wild bees are out and actively pollinating blueberry blossoms. The most common wild pollinators that have been observed are bumble bee queens and solitary mining bees (genus *Andrena*). Bumble bees are going through their solitary life stage in early spring when the queens are the only individuals in the nest. This solitary life stage poses a critical time for bumble bees because if they do not find enough floral resources or if they are exposed to lethal levels of pesticides, the queen may die and the colony will not develop. While insecticide use for blueberries is low early in the season, fungicides are used during bloom to control botrytis and secondary infections of mummy berry, and some of these are also toxic. Category 3 fungicides (Indar, Proline, Quash, and Tilt/Orbit) are known to be highly toxic to bees, so they should be avoided during bloom. They may be used earlier for sprays targeting primary infections of mummy berry, which are made prior to bloom, and fungicides in category 11 (Abound) or 9 and 12 (Switch) may be used instead of them during bloom. Take other precautions to protect pollinators, such as mowing blooming weeds like dandelion in row middles prior to spraying, and/or applying sprays after sunset to minimize bee exposure.

Mining bee pollinating blueberry. Photo credit: Nash Turley.

Bumble bee queen pollinating blueberry. Photo credit: Margarita López-Uribe.

The cool temperatures are also keeping warm-weather disease issues tamped down at this point; however, growers are cautioned to remain vigilant. Symptoms of our newest strawberry disease, **Neopestalotiopsis**, are manageable at this point in the few plantings where this disease is present. Growers continue to report 'Flavorfest' plant collapse; this is thought to be due to **Phytophthora crown rot** that may have been transported with the plants, as even plantings on new ground have had this issue.

Windy conditions have resulted in leaf rubbing on strawberries; symptoms are a brown bruising of plant tissue which could be easily mistaken for a foliar disease. This type of damage can be differentiated from foliar diseases in that symptoms are present primarily on the uppermost leaves, and any discoloration is only on the surface. Brown markings on petioles are not sunken as with anthracnose.

Tarnished plant bug nymphs are present in strawberry plantings; however, insecticide applications should be avoided until bloom is complete. The threshold for making an insecticide application is 1 tarnished plant bug nymph per 4 blossom clusters, so it is recommended that growers scout as soon as bloom is over and be ready to make an application if needed. This may need to be done by variety to avoid misshapen fruit. Tarnished plant bug nymphs look very different from the adults and do not fly. It is easiest to find the nymphs by tapping blossom clusters over a light-colored surface such as a sheet of paper, as they quickly try to hide once they detect movement. The adults fly away very quickly, so brushing the foliage and identifying them once they land elsewhere usually works best.

Tarnished plant bug nymph on strawberry fruit and adult on strawberry blossom. Photo credits: Kathy Demchak.

RESOURCES FOR STAY UP TO DATE WITH THE LATEST INFORMATION

- 1-800-PENN-IPM hotline had expanded its menu options starting with the 2020 production season. Dial 1-800-PENN-IPM (1-800-736-6476) and select from a range of crop groups and topics from vegetables (onion, tomato/potato, sweet corn, vine crops), small fruit, tree fruit, to greenhouse IPM and hear weekly updated 90 second voice messages with the latest information on crop, pest and disease management to help you through the growing season.
- Sign-up with Penn State Extension to receive the latest news and information on vegetable and small fruit crop production as well as pest and disease management either electronically or by USPS (1-877-345-0691).
- The 2020-2021 Mid-Atlantic Fruit and Vegetable Production Recommendations contains the latest information to help commercial vegetable and strawberry growers in the mid-Atlantic regional make production and pest management decisions. The hardcopy can be purchased either online or by calling 1-877-345-0691. Individual sections are also available for download here. This publication will now be updated every other year so the next update will be in 2022.
- The MyIPM app is available for free from the Apple Store and Google Play, and covers strawberries, blueberries, and blackberries in addition to tree fruit crops. The App is updated with current pests and cultural and chemical controls. More info can be found here: https://www.clemson.edu/extension/peach/commercial/diseases/myipmsmartphoneappseries.html

Ms. Demchak is with the Dept. of Plant Science and Dr. Lopez-Uribe is with the Dept. of Entomology, both at Penn State Univ.
From Penn State Extension, https://extension.psu.edu/2021-current-issues-for-pa-vegetable-and-berry-crops-may-14, May 14, 2021.

BERRY PRODUCTION

Strawberry and Blueberry Pollination

Gordon Johnson

Strawberry

Strawberries are aggregate fruits. They have multiple ovules per receptacle where the fruit is formed. The strawberry receptacle may have up to 500 ovules per berry. You will see these as "seeds" on the outside of the strawberry fruit which are called achenes. To have the largest berry possible, you need as many of these ovules to be successfully pollinated as possible. To avoid misshapen fruits the achenes need to be pollinated evenly and fully. With pollination, the receptacle tissue around the achenes will develop to form the strawberry fruit.

Strawberries have both male and female flower parts on the same flower and can self-pollinate. Wind and rain can move pollen within the flower. However, this usually does not allow for full pollination of all the ovules. Bees, such as honeybees or bumblebees, are usually necessary to allow for complete pollination. Some flowers produce bigger berries when cross pollinated with pollen from other flowers. Incomplete pollination will often result in smaller or misshapen berries.

Strawberry flowers are not heavy nectar producers. However, bees do visit the flowers and studies have shown that where native bees are limited, adding hives of honeybees or bumblebees increased productivity. It is recommended that each flower receive 16-25 bee visits. This is particularly true of the king berries, which form from the first flower to open on a fruiting truss.

Blueberry Pollination

Northern highbush blueberry bushes can produce berries even when there is no or limited pollen movement by bees. Some of the flowers can turn into berries, even if there are poor pollination conditions or low bee activity during bloom. However, often these berries will be small, slow to ripen, and may drop off early. For maximum potential yield, it is important that the flowers are visited by bees during bloom to transfer sufficient pollen while the flower is still viable so that fertilization can occur, leading to seed set, berry expansion, and larger berries.

In addition, some varieties benefit from cross pollination. Fields should be planted will a combination of varieties that bloom around the same time and that are compatible. For cultivars dependent on having cross-pollination for full yields, this can provide a 10-20% increase in yield from the improved fruit set and berry size.

Flowers of blueberries are generally less attractive to honeybees than other flowers due to the relatively low nectar. Because of this, move bees into blueberry fields after 5% bloom but before 25% percent of full bloom to avoid movement to more preferred flowering plants. Placement near to the blueberry field can also help to keep them focused on the crop.

Research has shown variation across northern highbush cultivars in their needs for bee pollination due to the relative attrac-

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POTATO PRODUCTION

Potato Tuber Physiological Age, Sprouting and Emergence

Gordon Johnson

AI recently received a question about variable potato sprouting in the field. While field and planting conditions, soil temperatures, seed piece handling all have an effect, another factor is seed age.

Potato tuber physiological age will determine seed piece sprouting. The physiological age is affected by harvest conditions, calendar (chronological) age, and storage conditions.

During seed tuber storage, the main influence on physiological aging is temperature. Higher storage temperatures cause greater physiological aging, colder storage keeps seed potatoes in a young stage.

In general seed potatoes can be divided into old and young physiological groups. Physiologically older aged seed emerges earlier, grows faster, yields higher early, and yields less later than physiologically young unaged seed. Physiologically young seed has more vigor, produces higher yields of larger tubers than old seed and is ideal under long production seasons.

To age seed, store at 38°F then before planting store for 2 to 6 weeks at 55-60°F. To hold young seed, store at 38°F and warm to 45°F just before cutting and plant in soil about the same temperature as the tubers.

Field Characteristics of Physiologically Young and Old Seed

Characteristic	Young Seed	Old Seed
Emergence	slower	faster
Stand	greater	lesser
Early Vigor	greater	lesser
Foliage	more	less
Stems/Plant	less	more
Tuber Formation	later	earlier
Formation Period	longer	more uniform
Tuber Number	less	more
Tuber Bulking	longer	shorter
Tuber Sizing	larger	smaller
Senescence	later	sooner
Early Harvest Yield	lower	greater
Late Harvest Yield	greater	lower

When large tubers are desired, young seed that produce few sprouts should be considered. For early fresh market, older seed may be more desirable to get a higher yield early and a quicker vine senescence. Older seed also may be more desirable where a smaller tuber is sought.

*Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 29, Issue 5, April 23, 2021.*

GREENHOUSE PRODUCTION

Manage Your Transplant Watering Schedule

Andrew Wyenandt

Differences in soil moisture across a single flat of tomato transplants.

Roots of tomato transplants in a flat that has irregular soil moisture.

The weather this spring has been relatively normal to date. However, we have had some dry weather these past few weeks. Unfortunately, weather patterns can cause problems in transplant production, especially when it comes time for watering. Hot days may require more than one watering, and cloudy days may require no water. In either case, growers need to anticipate their transplant water needs without over or under estimating watering. Of course, other factors include the growing media and the plant itself. Lets focus on media, for example, growers using a lighter soilless media, these will dry out much quicker than a heavier media and will require more daily watering (e.g., once in AM, afternoon, and evening). Growers using a heavier media may only have to water once a day, or early in the AM and maybe once more in the PM. Either type of media works fine as long as the weather doesn't change and it fits the growers needs. **Proper transplant watering is all about adjustment.** If you have stuck to the same daily watering schedule this spring its very likely you have grossly over or under watered your transplants at some point. And, in all likelihood, grossly over or under watered trying to correct the situation. Uniformity is also key when it comes to proper transplant watering. If you find yourself spot watering out of schedule because some flats dry out quicker than others then most likely your uniformity is off. This is easily done when watering is done by hand with a wand. Poor uniformity can also be the result of transplant flats being set on uneven benches or uneven floors. Much like a field, low spots tend to collect the most water. All of this can lead to uneven transplant growth as well as disease and pest pressure, such as fungus gnat problems. If you are experiencing uneven transplant growth, then most likely your watering is uneven. For transplant growth to remain even, flats need to be watered each time to maximum water holding capacity, where each cell in the flat holds the maximum amount of water. An easy way to see this is to watch for water dripping out the bottom of the flat. As important, flats should also uniformly dry out. Below is an example of tomato transplants that have been pulled from the same flat. You can see the differences in plant height as well as root system formation as a result of uneven watering in a "heavy" soilless media. Cells that have remained on the wet side show poor growth and poor root system development because of a waterlogged cell; whereas cells that have been receiving the

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Edema Problems in Greenhouse Tomatoes

Jerry Brust

An odd problem was seen in tomato plants being grown for harvest in a greenhouse that showed blister or callus-like growths, usually along veins that first appeared on the underside of older leaves (Fig. 1). Leaves also showed unusual curling and other odd distortions on the top side of the leaf (Fig. 2). In addition, there can be spots of necrotic leaf tissue. Leaves with a great deal of this blistering were brittle with the leaf often cracking with any type of handling. Karen Rane from the diagnostic lab recognized these symptoms as edema (or sometimes spelled oedema). Edema is caused by the buildup of excess water in the root and conditions unfavorable for transpiration, usually caused by high humidity. When the tomato plant cells get too much water the cells will expand faster than they can get rid of the water leading to split and cracked tissue. Extensive edema can severely decrease the leaf's photosynthetic capability and lead to senescence. Other research has looked at poor or low light sources that affect the plants ability to expel excess water. So basically overwatering, high humidity and low or poor light are the major causes for the development of edema. Therefore, avoid overwatering plants in the greenhouse especially during cool temperatures when they should be kept slightly on the dry side. Keep humidity levels below 70% by enhancing airflow around the plants and by spacing the plants farther apart. Though more complicated, research has shown that increasing light quality by providing a more "full-spectrum" of light output, with significantly more short wavelength energy (i.e., UV light), will also decrease the occurrence of edema.

Figure 1. Underside of tomato leaf showing swollen tissue caused by edema.

Figure 2. Top side of distorted tomato leaf with edema.

Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the ***Weekly Crop Update****, Univ. of Delaware Extension, Vol. 29, Issue 5, April 23, 2021.*

CLASSIFIEDS

Employment

HELP WANTED – ST LUKES RODALE INSTITUTE ORGANIC FARM – FRUIT MANAGER Rodale is offering a Fruit Manager position for our organic community supported agriculture (CSA) and wholesale operations at the St. Luke's Rodale Institute Organic Farm. The farm is a partnership between the Rodale Institute and St. Luke's Hospital to create an innovative farm-to-hospital model. Over the last seven years the farm has had a robust vegetable production operation and now we are looking to expand the farm to include a variety of fruits. The Fruit Manager will lead St. Luke's farmers to produce and deliver safe, healthy, organic fruit to all hospitals in the St. Luke's Health Network. Additionally, the Fruit Manager will coordinate with St. Luke's hospital staff and dining services to meet produce requests and deliveries. This position will report to the Rodale Institute Farm Director. Applicants should be driven, hardworking, and committed to organic agriculture practices. All candidates must be prepared to work in a professional environment, complete tasks carefully and in a timely manner, and work in all weather conditions. For further information, contact: Elaine Macbeth, Director of Finance/HR, at elaine.macbeth@rodaleinstitute.org.

Remember — Classified Ads are FREE for PVGA Members for non-commercial sales.

Strawberry and Blueberry Pollination *continued from page 21*

tiveness of different cultivars and their degree of self-compatibility. Experience shows that a minimum of 2 hives per acre are needed. In some cases, 5 hives per acre are recommended (such as for Jersey and Earliblue). Some growers are using up to 8 colonies per acre to ensure good pollination if spring weather is cool and there are only a few good days for honeybee activity. A rule of thumb is that you'll need 4 to 8 honeybees per bush in the warmest part of the day during bloom to get blueberries pollinated.

Bumblebees are very efficient at pollinating blueberry, with activity at lower temperatures than honey bees, faster visits to flowers, and higher rates of pollen transfer per flower visit. A single visit of a bumble bee to a blueberry flower can deposit sufficient pollen to get full pollination, whereas three visits are needed by honeybees.

Blueberry information was adapted from https://bee-health.extension.org/pollinating-highbush-blueberries/

Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the ***Weekly Crop Update****, Univ. of Delaware Extension, Vol. 29, Issue 6, April 30, 2021.*

Manage Your Transplant Watering Schedule *continued from page 22*

appropriate amount of water have much better growth and a nice root ball. The weight test. When was the last time you picked up a transplant tray? **Picking up a transplant flat every once in a while will give you an idea of how well your watering schedule and uniformity is!** Everyone has picked up a tray that has felt like it has the weight of a rock or the tray breaks apart because of the weight, or when you pick it up and it feels as light as a feather. Doing this is a good way to determine if your soilless media is "heavy" – holds more water than you think or if you have been overwatering on days you shouldn't be or if you have not watered enough. Consistency is key when watering. Going from an extremely wet to an extremely dry transplant tray is not what you want for the transplant production season. You want consistent soil moisture as much as possible, thus proper transplant watering is all about the proper adjustments and knowing your media.

Dr. Wyenandt is a specialist in Vegetable Pathology with Rutgers Cooperative Extension. From the ***Plant and Pest Advisory****, Rutgers Cooperative Extension, https://plant-pest-advisory.rutgers.edu/manage-your-transplant-watering-schedule-2/, May 19, 2021.*

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