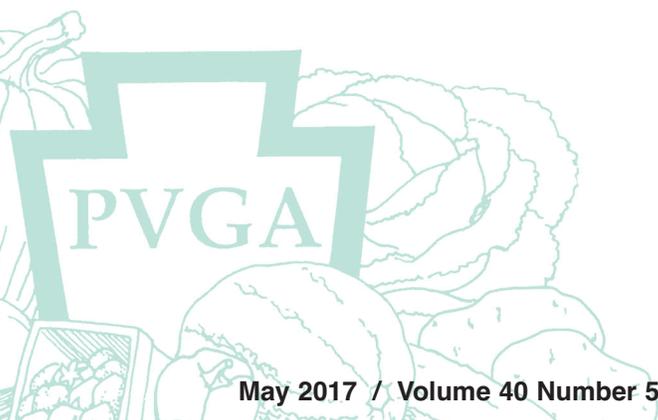


PENNSYLVANIA
VEGETABLE GROWERS

NEWS



May 2017 / Volume 40 Number 5

for the commercial vegetable, potato and berry grower

Penn State Research Field Days Set for July 12 and 25

A summer Vegetable and Fruit Field Day at Penn State's Russell E. Larson Agricultural Research Center is being planned for July 12th! Growers will have an opportunity to see equipment demonstrations and learn about the latest developments in vegetable, berry, and tree fruit research. Breakout sessions related to vegetable disease identification, high tunnel berry production, weed identification and other subjects are also being planned. More details will be forthcoming in the weeks ahead.



PVGA will also sponsor a grower Field Day at Penn State's Southeast Agricultural Research and Extension Center in Manheim (Landisville) on July 25, 2017, to allow growers to see first hand the numerous research projects

that are funded by the Association and the Vegetable Marketing and Research Program. Further details about that Field Day will be published in the June newsletter.

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., Jun. 7 - noon – Strawberries
- Tue., Jun. 20 – 8:00 p.m. – Veg. Weed Control
- Wed., July 5 – noon – Blueberries/Brambles
- Tue., July 18 – 8:00 p.m. – Vegetable Insect Pests

- Wed., August 2 – noon – Vegetable Diseases
- Tue., August 22 – 8:00 p.m. – Tomatoes/Peppers
- Wed., September 6 – noon – Vegetable Diseases
- Tue., September 19 – 8:00 p.m. – Pumpkins
- Tue., October 2 – 8:00 p.m. – Veg. Research Needs

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.

NEWS



Pennsylvania Vegetable Growers Association

An association of
commercial vegetable,
potato and berry growers.

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Pest Scouting With Your Smartphone

Mike Basedow

Have you noticed lately that many interstate rest stops are now called text stops? While the ever growing ubiquity of the smartphone has come with some issues, there are many opportunities to use this technology to make our lives a little easier, even on the farm.

Pest scouting is an important part of any farm operation. To manage a crop, whether it is fruit, vegetables, or row crops, we have to be out looking at the plants regularly to see what condition they are in. Scouting can sometimes be a challenge. Occasionally you might see an insect or a disease symptom you don't recognize, or maybe you aren't certain of the best way to set up a scouting routine, or how to keep good records of what you find in the field. Luckily, you are not alone, and there are a number of programs to help make this easier!

If you need help identifying diseases on your fruit, MyIPM (<https://apps.bugwood.org/apps/myipm-series/>) is a series of apps to help identify and manage common fruit pests and diseases. It was developed by Clemson University, in collaboration with Penn State and other land grant universities. One app includes diseases commonly found in Northeastern apple, pear, cherry, and cranberry production systems. In addition to containing diagnostic tools to help you determine what you are seeing in your block, the app describes the causal agents of the disease, and their various control tactics. For chemical controls, the app includes relevant information, including: active ingredients, rate per acre, REI, and PHI.

In addition to knowing what you are seeing, it is important to have a good scouting plan, and a good way to keep records of what you are finding so you can better manage any potential issues you find in the field. The Penn State Tree Fruit team has recently released a mobile scouting spreadsheet to help plan your apple scouting procedure, and to help you keep track of what you are seeing in the field. The app provides simplified instructions on how to scout your orchard block, including which parts of the tree to be looking at for each pest. The instructions tab also includes links to tables describing which pests and diseases you should be looking for at different crop growth stages, and also links to articles on pest trapping and disease forecasting. From there, you can enter your counts onto the spreadsheet. The sheet will automatically calculate your block averages from the trees you scouted, and results will also automatically copy over to a summary sheet. On this page you can view your entire insect, disease, and weed averages for your block to help you determine your management strategy.

The spreadsheet can be linked between multiple devices, so it can easily be shared between different people on your farm. Your reports can also be sent between your phone and computer in real time, so you can save it on your computer in an excel sheet for your records. The spreadsheet is currently being actively tested, and the Tree Fruit Team welcomes any suggestions. While designed for apple scouting, the spreadsheet is based in excel, and can also be easily modified for other crops.

If you would like to demo the mobile spreadsheet, email mxb1072@psu.edu for a copy. If you would like a paper copy, email or call 717-334-6271 to request a paper form.

Mr. Basedow is with Penn State Extension in Adams County. From the **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, May 24, 2017.



Photo: Norma Young, Penn State

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.

National News Briefs

Building the Next Farm Bill

Congress isn't due to vote on the next farm bill until 2018. But the American Farm Bureau Federation is already working to ensure farmers have a voice in the process.

The organization has been monitoring the political climate surrounding the bill and seeking out allies, said Dale Moore, AFBF's Executive Director of Public Policy. And a working group made up of 16 state Farm Bureau staff, economists and commodity experts is working to determine what issues farmers want to see addressed.

The panel has identified key issues and come up with a menu of options that could be considered by county and state Farm Bureaus through the policy development process. That effort began with the 2016 policy development process, which resulted in a new section in the policy book related to the farm bill.

If Pennsylvania farmers have items they want to see addressed in the next farm bill, the best place to start that discussion is at the county Farm Bureau level, said Kristina Watson, Pennsylvania Farm Bureau's Director of Federal Government Affairs and a member of that group. "That's really the most important thing," she said. "If members have something that's important to them, they need to be talking about it with their county and bring it up through the policy process."

Moore said it's also important for farmers to share their priorities with their federal lawmakers. Legislators are more likely to be receptive if they can see how an issue affects a constituent directly. "The most important thing for grassroots members to share is the personal story," he said.

For more information, visit: bit.ly/2oQAM7R.

*From the **Penna. Agricultural Alliance Issues Update**,
Penna. Farm Bureau, May 2017.*

Farmers Need Comprehensive Tax Reform

Farm Bureau is calling on lawmakers in Washington to enact comprehensive tax reform that gives them the freedom to grow and recognizes the uncertain world they operate in.

"Running a farm or ranch business is challenging under the best of circumstances," said Patricia Wolff, Senior Director of Congressional Relations for the American Farm Bureau Federation. "Farmers and ranchers need a tax code that recognizes the unique financial challenges that impact them."

The good news is that both leaders in Congress and President Donald Trump have signaled that tax reform is among their priorities. Lawmakers have been refining their plan for months and the Trump administration recently outlined its proposal.

Wolff said the administration's proposal gives a broad outline but more details will need to be filled in. And as that happens, AFBF will be working to make sure farmers' needs are taken into consideration. "It's a starting point and everything that's in there will be examined with a fine-tooth comb," she said.

The plan calls for reducing taxes on all businesses to a flat rate of 15 percent. Lower tax rates would be a positive for farmers, Wolff said. But she said, the bill must spell out that the business rate applies to farms, 94 percent of which now pay individual tax rates.

Tax rates are a major factor in determining how much farmers pay. But Wolff said, even more important are the effective rates farms pay after deductions and credits are figured in. The

benefits of a lower tax rate could be easily undone if farms can no longer take advantage of deductions that are designed to smooth out the cyclical highs and lows and capital costs that are a major part of agriculture.

The administration's plan also calls for the repeal of the estate tax, which farmers have long advocated for, Wolff said. But she said, it's important that the reforms also keep the stepped-up basis for capital gains taxes on inherited assets to ensure that farmers are not hit with extra taxes on inherited property that has increased in value.

The plan would maintain the capital gains tax. Wolff said farmers need that tax to be reduced and for land that remains in production to be exempted. That tax, assessed on the increase in value when property is sold, is especially damaging to farms because agriculture requires major investments in property.

*From the **Penna. Agricultural Alliance Issues Update**,
Penna. Farm Bureau, May 2017.*

Farm Bureau Happy with WOTUS Outreach

Farm Bureau is happy to see federal regulators seeking input as they draft a possible replacement for the Waters of the U.S. rule. The U.S. Environmental Protection Agency sent a letter to state governors asking for their thoughts on what a new water-protection rule should look like. WOTUS is under review by the White House Office of Management and Budget, a first step to the regulation being repealed. Farm Bureau opposes WOTUS and believes it is too broad and would result in even minor ponds and ditches being considered federal waterways. That would subject farms to additional regulation. "This is an important, first step towards the restoration of law in environmental regulation," said American Farm Bureau Federation President Zippy Duvall. "A distant and unaccountable Washington bureaucracy has too often punished farmers and ranchers for alleged infringements that have no basis in law."

*From **Farm Bureau Express**, Penna. Farm Bureau, May 19,
2017.*

Producing Biofuels on Marginal Land May Not Impact Greenhouse Gases

A study has found that producing biofuels on marginal lands, like those enrolled in the Conservation Reserve Program, may not increase greenhouse gas emission.

Researchers at Penn State studied whether there was an increase in nitrous oxide from the growing biofuel plants like switchgrass and miscanthus. Researchers grew both crops in an experimental area and compared the emissions of nitrous oxide against undisturbed CRP acres.

Nitrous oxide is produced by organisms when soils with excess nitrogen from fertilizer coincide with saturated soils, like after a rain or snow event. If nitrous oxide emissions increased on CRP lands that were used for bio-energy, it would undermine the ability of using those lands for energy production.

But researchers determined that CRP and other marginal lands, like streambanks and set-aside acres could support biomass production without impacting greenhouse gas emissions. Energy crops can help reduce the nation's carbon footprint and create a domestic source of renewable fuels, according to Penn State. Expanding energy crops would require new acreage, and CRP lands may be suitable for expansion.

"Due to the high biomass production potential, these crops can use up nutrients that otherwise would go to streams and

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end up in the Chesapeake Bay," said Armen Kemanian, one of the researchers involved in the study. "Thus, when these perennial energy crops are added to heavily agricultural landscapes, the results can be a win-win—low-carbon energy and cleaner water."

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Cover Crops Can Play Role in Mitigating Climate Change

Cover crops can play an important role in combatting climate change, including reducing nitrogen losses, according to a Penn State scientist.

The ability of cover crops to mitigate climate change is in addition to the role cover crops play in reducing soil loss and fixing atmospheric nitrogen.

"Many people have been promoting no-till as a climate-mitigation tool, so finding that cover crops are comparable to no-till means there is another valuable tool in the toolbox for agricultural climate mitigation," according to Jason Kaye, a professor at Penn State.

Kaye partnered with researchers in Spain to examine how cover cropping compares in different regions of the world. Their research shows that cover crops mitigate climate change by increasing soil carbon sequestration and reducing fertilizer use. Cover crops also provide the benefit of reduced soil erosion, better water management options in periods of drought and the retention of nitrogen, Kaye said.

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Researching Honey Bee Health

Researchers, including some from Penn State, have identified the core set of honey bee genes that are crucial to the insect's health response to diseases.

That discovery could help scientists as they try to pinpoint causes in honey-bee declines, and also develop breeds of bees that are more resilient to health stressors.

Honey bee populations have sustained losses due to a variety of factors, including diseases brought by fungus and viruses. Detecting genes responsible for disease response could help develop bees that are resistant to this pathogen, said Vincent Doublet, a researcher from the University of Exeter that was involved in the study.

Recent advances in the sequencing of DNA enabled researchers to better pinpoint the role specific genes play in honeybee health. Researchers were able to develop a new tool that allowed scientists to better compare genes and their overall role bee health.

"We have learned that honey bees rely on a core set of genes that they turn on or off in response to any major pathogenic challenge," said Robert Paxton, a professor of zoology at the German Centre for Integrative Biodiversity Research. "We can now explore the mechanisms by which pathogens overcome their honey-bee hosts, and how honey bees can fight back against those pathogens."

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Apply Now for Rural Entrepreneurship Challenge

Rural entrepreneurs can compete for startup funds in Farm Bureau's Rural Entrepreneurship Challenge. Farm Bureau

members age 18 or older may apply with ideas related to for-profit businesses involving food and/or agriculture. Food ideas must incorporate at least one local agriculture product. Judges will review the applications this summer and then announce four finalists to receive \$15,000 each and compete at the 2018 American Farm Bureau Annual Convention. Best-in-show prizes of \$10,000 each will also be awarded for startup ideas in the following categories: Farm, agritourism, farm-to-table, agriculture tech and support services, craft beverage and local product. The deadline to apply is June 30. For more information or to apply, visit: www.strongruralamerica.com/challenge.

From Farm Bureau Express, Penna. Farm Bureau, May 19, 2017.

Farmers Wanted for Reality Television Show

Producers of a new, agriculture-based reality television show that's planned to air on a major cable network are looking for farm families to be the stars. According to BoBCat Studios, "American Farmer is the sweeping new series that puts viewers on the front lines of the battle farmers wage to produce the food that sustains us all. It's a complex story of family dynamics, punishing weather, cutting-edge science and old-school determination." For more information or to express interest in interviewing and possibly auditioning for the part, contact Joe Pinzone with BobCat Studios at joepinzone80@gmail.com or 917.674.2516.

From Farm Bureau Express, Penna. Farm Bureau, May 19, 2017.

Regulatory Reform Bill Clears U.S. Senate Committee

A Farm Bureau-supported 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 measure, 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. 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 measure already passed the House.

From Farm Bureau Express, Penna. Farm Bureau, May 19, 2017.

State News Briefs**Time to Advocate for Agriculture in State Budget**

Pennsylvania Farm Bureau is hard at work ensuring that agriculture priorities are considered as state leaders finalize the 2017-18 budget. But we need help from members too. Lawmakers respond most to their constituents so it's important that members contact their state representatives and senators to discuss priorities for farms. Farm Bureau is concerned about proposed cuts to the Department of Agriculture staff. According to Agriculture Secretary Russell Redding, "these cuts would effectively render the department incapable of administering programs that help create new markets for producers, such as PA Preferred, international trade, and the Specialty Crop Block Grant program; that safeguard land from development through Pennsylvania's nation-leading Farmland Preservation Program;

(continued on page 6)



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NEWS

State News Briefs *(continued from page 4)*

that ensure the industry's long-term viability; and that provide basic nutrition to the state's most vulnerable citizens... The department would also have to consider eliminating food inspectors who ensure restaurants and food and milk processing and manufacturing facilities." PFB is also urging lawmakers to support the restoration of funding for the University of Pennsylvania School of Veterinary Medicine. Penn Vet plays a key role in helping farmers produce healthy food, monitor diseases and train the next generation of Pennsylvania veterinarians.

From Farm Bureau Express, Penna. Farm Bureau, May 19, 2017.

Tax Reform Bills Pass State House Committee

The state House Finance Committee has adopted three bills that bring state laws governing small business taxation more in line with federal standards.

The bills are part of a tax reform package introduced by House lawmakers that will also help level the playing field between small businesses and corporations. They now head to the full House for consideration.

House Bill 331 would bring Pennsylvania tax laws in line with federal standards of "like-kind" exchanges. Federal law allows for a tax deferral when property is exchanged for similar property, but Pennsylvania does not have any provisions. House Bill 332 would allow small businesses to use the Net Operating Loss deduction.

House Bill 333 would bring state tax laws for Section 179 depreciation in line with federal standards. At the federal level, Section 179 allows small business owners to deduct the purchase of qualifying equipment up to \$500,000 during the tax year. Currently, Pennsylvania limits deductions for small businesses under Section 179 to \$25,000, while allowing businesses registered as C-corporations to use the full \$500,000 deduction as allowed by IRS law.

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Wind Power Bill Advances

A bill that would allow construction of wind turbines on preserved farmland has cleared its first hurdle in the state Legislature.

The measure, House Bill 187, unanimously passed the Agriculture and Rural Affairs Committee. It now heads to the full House for consideration. The proposal would allow owners of preserved farmland with 50 or more acres to grant rights-of-way for installation of wind power generating systems. Now, such landowners may grant rights-of-way for utilities such as water, sewage, electric, telephone, underground mining and gas- or oil-product lines. The bill would add wind power to the list.

Some farmers have seen benefits from leasing space to wind farms and those who operate on preserved farmland should not be denied that opportunity.

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Penn State Makes Changes to Extension Operational Structure

Penn State University is changing the operational structure of its Extension offices, with an effort at building customer relationships. The changes will allow Extension to evolve into the digital age and use technology to showcase services and research available.

Penn State Extension is moving away from the position of district directors and is instead splitting it into two positions: a customer relations manager and a business operations manager. Extension will be organized into 10, multi-county areas. Client relations managers will focus on building county-level support for Extension and its programs and finding ways to best serve communities. The business operations manager will focus on the day-to-day operations of county offices.

As part of the change, all Extension educators will now be part of a unit that works in collaboration with the experts in the College of Agricultural Sciences. Educators will be able to draw on expertise from across the college's academic departments. Penn State is also working on ways to deliver training and information, including a number of digital products such as videos, webinars and online resources.

"These steps are designed to dramatically improve the relevancy, usability and reach of our programs and services," said Dennis Calvin, director of Penn State Extension. "The goals are to listen and learn, to match customer needs and priorities with a robust portfolio of science-based information and education."

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Controlled Plant and Noxious Weed Act Introduced into the General Assembly

The Controlled Plant and Noxious Weed Act, designed to update the Pennsylvania's noxious weed law, has been introduced into the General Assembly. The new act will focus on invasive plant management with an emphasis on effectively containing or eradicating the species. A component of the act will build awareness of the invasive weed problem and the importance of being proactive in preventing the spread of the species from one farm to another. Noxious seeds may be imported into the state through equipment and commodities. Preventing that will require additional attention to quality control from custom operators and seed, feed and forage producers. Custom farm equipment operators will need to identify invasive species where they operate and examine and clean equipment before moving to the next farm.

From the Penna. Agricultural Alliance Issues Update, Penna. Farm Bureau, May 2017.

Legislation Targeting Spot Assessments Advances

A proposal to protect farmers and other property owners from targeted legal action that can increase their property tax bills has advanced in the state House. House Bill 1213, sponsored by Rep. Warren Kampf of Chester County, passed the House Commerce Committee and is scheduled for a vote next week by the full chamber. State law prohibits counties from targeting a specific property for reassessment, a practice known as "spot assessment." But some school districts have been using a loophole to appeal the assessments of specific properties, which can result in the assessed value - and with it the tax bill - increasing. The bill would restrict that practice. "We know of farm families that have been the target of spot assessments, and it's a practice we find inherently unfair," said Darrin Youker, Pennsylvania Farm Bureau Director of State Government Affairs. A similar bill has been introduced in the Senate by Sen. David Argall. Farm Bureau supports both bills.

From Farm Bureau Express, Penna. Farm Bureau, May 19, 2017.

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NEWS

State News Briefs (continued from page 6)**PFB Takes Policy Development to Facebook**

Pennsylvania Farm Bureau's policy development process is starting now, with grassroots members beginning to think about what proposals they want to bring before their county Farm Bureaus with the hope of shaping state, or even national, Farm Bureau policy. And PFB is offering a new tool this year to get those brainstorming gears turning and help members engage in the process. The Pennsylvania Farm Bureau Policy Development Group on Facebook gives grassroots members a chance to learn more about how they can participate in shaping Farm Bureau policy, share news and information about topics related to possible policy proposals, engage in lively discussion and debate and even create and respond to polls. The group is not intended to replace the current county-driven structure, but, rather, is meant to serve as another medium to spark interest and discussion of policy issues. You must have a Facebook account and be a Farm Bureau member to join the group. To join, visit www.facebook.com/groups/farmbureauupd.

From *Farm Bureau Express*, Penna. Farm Bureau, May 19, 2017.

Planting Quality Seed in Pennsylvania

Seed sales are regulated in the state under the Pennsylvania Seed Act, which dictates the seed-testing requirements and ensures the quality of the seed being sold to agricultural producers. Farmers should only purchase seed that legally has a label with recent information on seed germination and purity, which reduces the risk of introducing unwanted weeds into fields. Seed technology may be protected under a patent or through the USDA Plant Variety Protection Act, which may include a prohibition on the sale of harvested seeds. Purchasing seeds in an unmarked bag, known as a brown bag sale, should be avoided. Purchasing properly labeled seed through a licensed seed dealer ensures a quality product that contains the desired seed technology to be used in accordance with the label.

From the *Penna. Agricultural Alliance Issues Update*, Penna. Farm Bureau, May 2017.

Pennsylvania Leads the Nation in Number of Farmers Selling to Consumers

More Pennsylvania farmers are selling their products directly to consumers than any other state in the nation, according to a nationwide survey conducted by the U.S. Department of Agriculture. While the state was fourth in the total dollar value of sales, it led in the total number of farmers involved in direct farm sales. Farm to consumer sales, including selling to wholesalers who distribute through food hubs, resulted in \$8.7 billion in revenue for farmers nationwide in 2015. The USDA survey found that 115,000 farmers were involved in direct-to-consumer sales at stores and farmers markets. California leads the nation with \$2.8 billion in direct marketing sales; while Pennsylvania farmers have \$439 million in direct farm sales. The Keystone State has more than 6,000 farmers engaged in direct to consumer sales.

From the *Penna. Agricultural Alliance Issues Update*, Penna. Farm Bureau, January 2017.

Help Us Spread the Word: Educator's Ag Institute

The Pennsylvania Friends of Agriculture Foundation is committed to growing agriculture literacy. And one way the foundation achieves that goal is by helping educators develop lesson plans based on agriculture.

The foundation, a charitable organization supported by Pennsylvania Farm Bureau, is hosting the Educator's Ag Institute this summer at Penn State. This year's institute, planned for July 9-13, will give teachers an up close and personal look at farming practices, and how they can use agriculture as the basis for lesson plans.

While at the conference, educators will tour a number of Penn State's agriculture facilities, participate in hands-on lessons and leave with a host of materials for use in their classrooms.

The Educator's Ag Institute is open to new educators, along with those who have previously attended our Ag in the Classroom workshop. Participants will also tour several area farms and hear from farmers about how they grow food, care for and feed their animals, and how the farm is run. Educators will receive Act 48 credits and/or can register for continuing education credits through Penn State.

Please consider sharing information about this valuable workshop with educators in your area. For more information, contact the foundation at 717.731.3556 or www.pfb.com/aginstitute.

From the *Penna. Agricultural Alliance Issues Update*, Penna. Farm Bureau, May 2017.

Lyme Disease Bill Passes Committee

A bill that would require health insurance providers to cover doctor-prescribed treatments for Lyme disease and other tick-borne illnesses has cleared a key state House committee.

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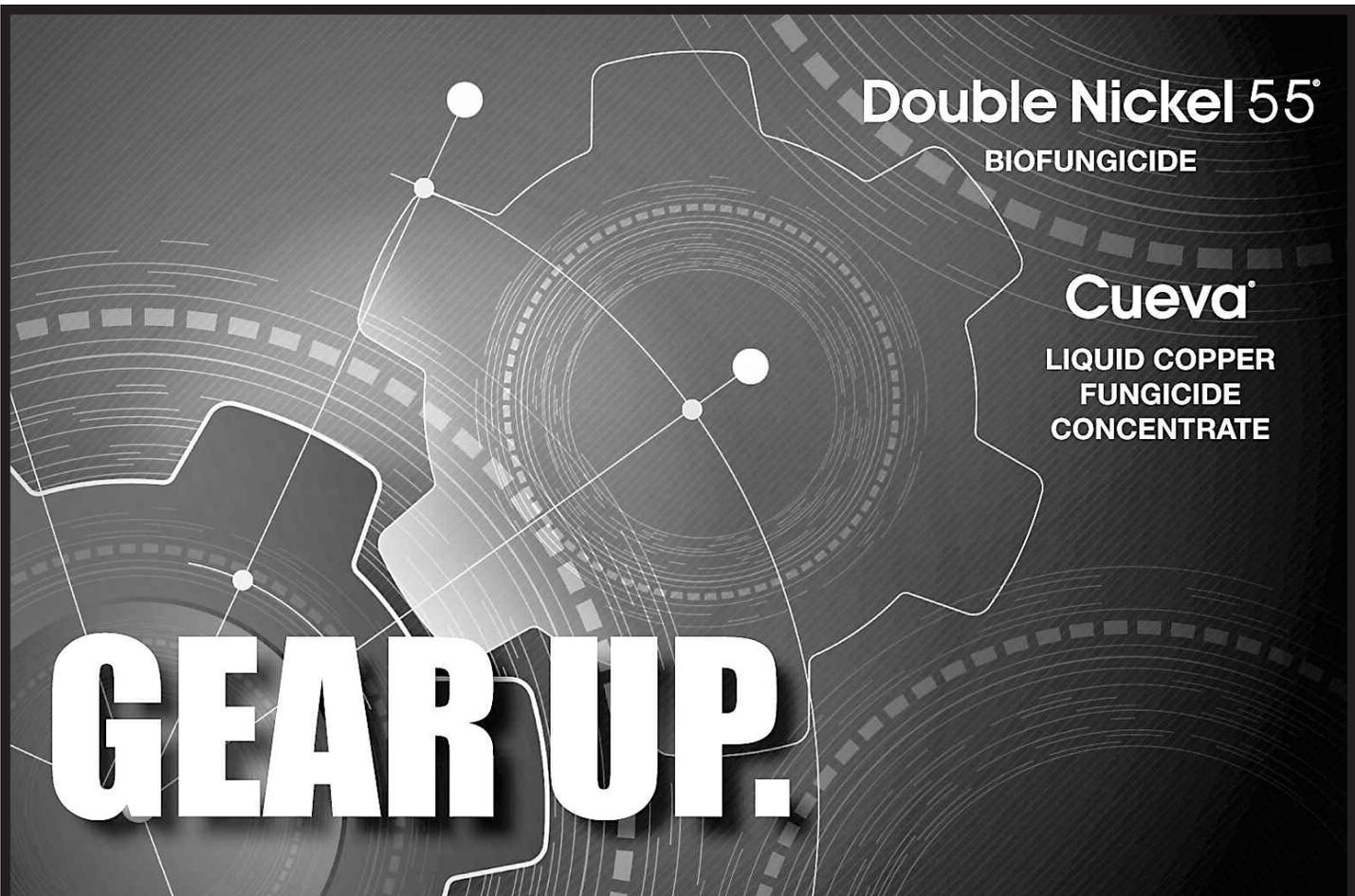
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GENERAL

On the Road—Toigo Organic Farms

Elsa Sanchez, William Lamont, Thomas Ford

Toigo Organic Farms is a 5 acre greenhouse farm that grows primarily tomatoes year-round, along with some eggplants and peppers.

Heirloom and hybrid tomatoes are marketed wholesale to grocery stores in Washington, D.C. as individual fruit and tomatoes on the vine (TOV) with TOV making up the majority of the crop. Crops are certified by the Ohio Ecological Food and Farm Association (OEFFA). We met with Kevin Matthews who has a variety of roles with the company including as assistant grower and project manager. We toured the third crop grown at the facility which was started in early December 2016 and will grow until about the second week of November 2017.

The Toigo greenhouse is from the Netherlands and uses cutting edge technology. The roof is made from diffused glass which lets 97% of sunlight through and fractures it to avoid

excessive radiation from damaging plants. This is compared to standard greenhouse glass which transmits about 85% of sunlight. In addition, Kevin was evaluating 2 LED lamps to determine if the technology is a good fit for the operation because as he said LED lights are effective, but expensive.

Cooling is accomplished by an automated system that opens ceiling panels: up to 50% of the roof can be opened at one time.



Toigo Organic Farms sign. Photo: Bill Lamont

NEWS

State News Briefs (continued from page 8)

House Bill 174 would require insurers to cover both short- and long-term antibiotic treatments. The measure, by Rep. Matt Baker of Tioga County, passed the House Health Committee and will now be considered by the full house. Farm Bureau supports the proposal. "Lyme disease and tick-borne illnesses are of significant concern for farm families, given the amount of time that farmers spend outside and near the habitat favored by ticks," said Darrin Youker, Pennsylvania Farm Bureau Director of State Government Affairs.

From *Farm Bureau Express*, Penna. Farm Bureau, May 19, 2017.

Report Shows Offset Costs Needed to Eliminate Property Taxes

A report by Pennsylvania's Independent Fiscal Office shows that it will take more than \$14 billion to offset the taxes collected through property taxes. The fiscal office, acting on a request from a member of the General Assembly, highlighted the cost it will take to shift school district funding from property taxes to other means. Looking at property taxes across the state, the Independent Fiscal Office estimated that total property tax collections for the 2017-2018 school year will be \$14.2 billion. By the 2021-2022 school year, the estimated property tax collection increases to \$16.4 billion.

The Independent Fiscal Office report does not examine specific proposals for eliminating property taxes, but simply projects the revenue need to cover expected future levies. Previous legislative proposals have looked at replacing property taxes with a mixture of increases in sales and earned income taxes. Pennsylvania Farm Bureau supports the elimination of school property taxes.

From the *Penna. Agricultural Alliance Issues Update*, Penna. Farm Bureau, February 2017.

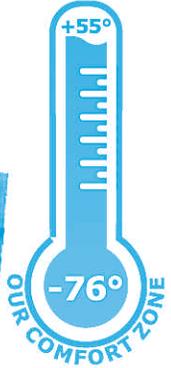


Two types of LED lamps in the greenhouse: the square one near the roof (yellow arrow) provides full spectrum light and the pink strip at the top of the plant canopy (white arrow) provides red and blue light. Photo: Elsa Sánchez

(continued on page 11)



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GENERAL

On the Road... (continued from page 10)

Rainwater captured on the roof of the facility is directed to a large tank. It is then heated during the day by a natural gas-fired boiler. At night this water is used to heat the greenhouse. Excess rainwater from the roof is diverted into a 750 gallon pond to supply water



During the day water from the yellow tank is heated by the boiler. Carbon dioxide produced by the boiler is used to enrich tomatoes in the greenhouse. Photo: Elsa Sánchez

for future irrigation needs. Drainage pipes have been installed below the planting beds to recycle water back through the irrigation system. Air is enriched with carbon dioxide (CO₂) to a maximum concentration of 2500 ppm using CO₂ generated from the boiler heating irrigation water.

To prepare the greenhouse for growing crops, a plastic membrane is placed on the ground. An 8 inch layer on organic matter is placed in rows on the membrane to support plant roots. White-on-black plastic with pre-punched planting holes is then placed over rows. Between rows, white landscape fabric serves to manage weeds. Weeds



White-on-black plastic mulch is lifted to add amendments including peanut meal and blood meal. Photo: Elsa Sánchez

are also managed by hand weeding and applying vinegar.

Four-week-old grafted tomato plants are set at a population of 3.2 plants per square meter. Vines are trained to 2 stems. Once stems reach a height

(continued on page 12)

Carbon dioxide is added to the greenhouse atmosphere through plastic tubes. Photo: Bill Lamont



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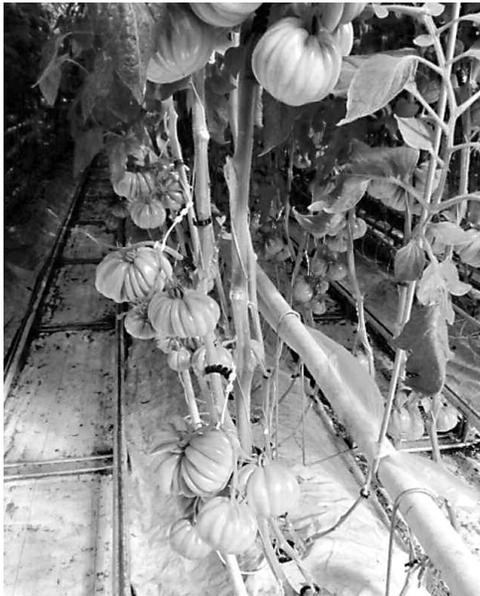
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GENERAL

On the Road... (continued from page 11)



Truss supports (black plastic) and j-hooks (white plastic) support fruit clusters.
Photo: Bill Lamont

of 15 feet, they are dropped and leaned. Training also includes removing suckers and supporting fruit clusters with truss supports and j-hooks. Leaves are pruned to expose the bot-

tom 3 fruit clusters. Biodegradable plant clips are used at Toigo. Once a cropping cycle is complete, vines with clips and trellis strings are composted. Once vines break down, strings are raked from the compost pile.

Nutrients are supplied by adding amendments to the planting rows and also through the drip irrigation system. Irrigation water is heated in the winter and cooled in the summer to be within 5 to 10 °F of soil temperatures to avoid shocking plants. Tissue testing is conducted weekly to keep up with plant nutrient needs.

For TOV sales, each flower cluster is thinned so that 4 to 5 fruit will develop. Heirlooms are sold as individual fruit. Bumble bees pollinate the crop. New boxes are brought in every 2 weeks and kept for 12 weeks.

Peppers and eggplants are grown along the end walls as a way to maximize space because they do not require dropping.



One of the two banks of bee boxes that are placed strategically in the greenhouse. Photo: Bill Lamont



Predatory wasps cards to manage whiteflies. Photo: Tom Ford

(continued on page 13)



Sweet specialty peppers growing along one end wall of the greenhouse. Photo: Elsa Sánchez

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GENERAL

On the Road... (continued from page 12)



Mullen banker plants support *Dicyphus hesperus*, a general predator of insect pests.
Photo: Tom Ford



Eggplant at the end of each tomato row is used as an early indicator of pest problems. Photo: Tom Ford

Large yellow sticky cards and long strips of sticky tape are part of the pest scouting plan.
Photo: Elsa Sánchez



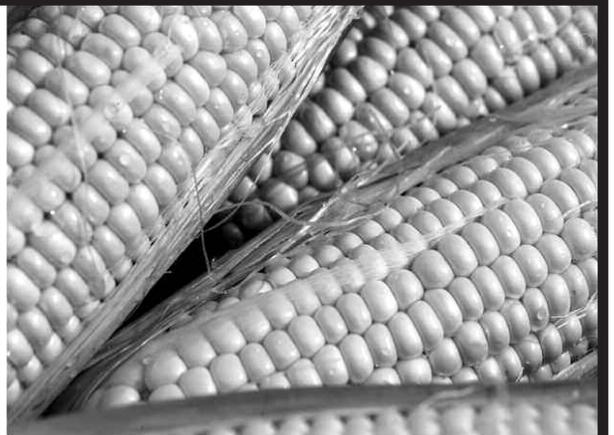
Pests are managed using integrated pest management tactics. Insect pests are managed with an aggressive biocontrol program. Releases of natural enemies occur weekly. Habitat plants are used to support natural enemies. Eggplant plants are placed at the ends of tomato rows to serve as indicator plants. Diseases are managed with a combination of cultural tactics and pesticides, when needed. The crop is scouted frequently.

Twenty to 30 employees, depending on the time of the year, maintain the crop. While we were there tomatoes were being dropped, suckers were being removed, and harvest was occurring. Four million pounds will be harvested from this single tomato crop.

(continued on page 14)



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GENERAL

On the Road... (continued from page 13)

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Dr. Sanchez and Dr. Lamont are with the Department of Plant Science at Penn State Univ. Mr. Ford is with Penn State Extension in Somerset Co. From the **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, April 27, 2017.



Tomato vines just dropped and leaned for the first time. Photo: Elsa Sánchez

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Just harvested fruit for TOV sale. Photo: Tom Ford



Harvested fruit for individual sale. Photo: Bill Lamont

Allium Leafminer Spring Update

Dana Roberts

The flight is over, but the war may have just begun! The larvae have taken hold and will remain steadfast as pupa throughout the summer.

The allium leafminer adult spring flight is done for the season! However, the larva and pupa are the now the main concern.

Eggs will hatch within a week of being laid and the larvae begin to mine. As the larvae grow they will begin to mine down the leaves toward the stem of the plant – even mining through leaf layers deeper into the stem for protection and food.



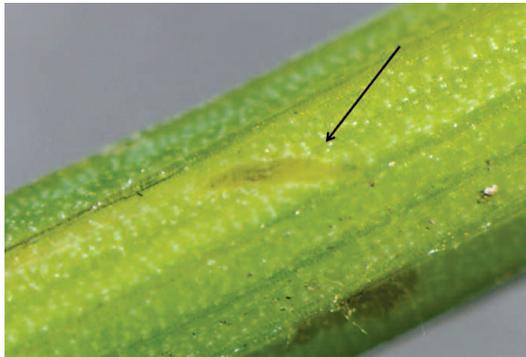
Allium leafminer adult on leek. Photo: Monica Ganser

your crop from disease and harvest before the adult flight in the fall, destroying all larva and pupa you find.

For chemical control recommendations, Shelby Fleischer created an allium leafminer amendment for the Mid-Atlantic Commercial Vegetable Production Guide 2016-2017.

For more information about the allium leafminer, including descriptions of the life stages, the Pennsylvania

(continued on page 16)



Allium leafminer larva inside mine on wild garlic leaf. Photo: Dana Roberts

Once the larvae are large enough, about 2-3 weeks of development, they will pupate within plant tissue. We estimate that the majority of the ALM larval population will have completed pupation by the 2nd week of June. At this point the pupa “hibernate” (called aestivation) through the summer months and will hatch as adults at the end of September.

In the late larval and pupal stages the majority of damage from ALM has already occurred to the plant. We do not know if this pest transmits any diseases but we currently do not believe that ALM does. What ALM does do is open up entryways for pathogens to infect the plant, which can be a major issue for yields.



Allium leafminer larval mine in wild garlic. Photo: Dana Roberts

So what can you do? Well, if you mostly have larva, then targeting the larva using some form of control that can penetrate the plant is best method.

If you have more pupa than larva, then treatment for the insect may not be effective due to the decreased metabolism of the pupa. The next best thing to do would be to try and protect



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VEGETABLE PRODUCTION

Taking it to the Field: Seeding and Transplanting Vegetables

Lee Stivers

Stand establishment is one of the most critical steps in producing a successful crop of vegetables.

Stand establishment means getting the crop off to a quick, healthy, and uniform start in the field. It also means using a planting arrangement that provides adequate room for plants to grow and develop, and one that makes it easy to manage the crop throughout the season. Weed control, pest control, fertilizer applications, irrigation, timing of harvest, and yield will all be influenced by the initial stand establishment.



Transplanting by hand can be labor-intensive.

Seeding and Transplanting

Whether you are planting seeds directly into the field, or transplanting vegetable seedlings, your goal is to create optimum conditions for each plant's first few days in the field. The goal is for seeds to start germinating rapidly, and for seedlings to suffer as little transplant shock as possible, as they move from seedling trays to the field.

Seeds - Seeds should have solid contact with moist soil so that they start the germination process soon after planting. Adjust seed depth to insure that seeds are placed in a zone with moisture, and that they are neither too shallow nor too deep for emerging from the soil. If field soil is light and fluffy, gently pack down the soil over the planted seed so that the seeds are in direct contact with the soil. Make sure that soil temperatures are

Allium Leafminer... *(continued from page 15)*



*Allium leafminer pupa within the stem of an onion.
Photo: R. Donoval*

Department of Agriculture and Penn State posted reports and a pest alert to these websites:

Allium Leafminer, PA Department of Agriculture (<http://www.agriculture.pa.gov/protect/plantindustry/pages/allium-leafminer.aspx>)

Allium Leafminer, Penn State Extension <http://ento.psu.edu/extension/vegetables/pest-alert-allium-leafminer> <http://extension.psu.edu/directory/dcr5101>

Ms. Roberts is with the Department of Entomology at Penn State Univ. From the Vegetable, Small Fruit and Mushroom Production News, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, May 30, 2017.

in the optimum range for the crop. Some vegetable seeds, such as beans and corn, germinate very slowly in cold soils; slow germination and emergence gives soil-borne pests more opportunity to damage the crop. Seeding equipment should be adjusted to ensure even placement of seeds along the row, at the optimum spacing for the crop. Too many skips in the row will result in lower yield; if too many seeds are planted, they will need to be thinned so that the plants aren't overcrowded.

Transplants - Transplants planted into the field will experience

some level of transplant shock. The goal is to minimize this transplant shock and get plants growing as soon as possible. Key to minimizing transplant shock is starting with transplants that are well watered, and supplying more water immediately after transplanting. Avoid transplanting into dry soil.

Even when planting into moist soils, newly planted seedlings need additional water. This can be accomplished by adding water to the transplant hole as the plants are set in, or by irrigating immediately after transplanting a field. When placing seedlings down in the planting hole in the field, ensure that

(continued on page 17)

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VEGETABLE PRODUCTION

Taking it to the Field... (continued from page 16)

the top of the root ball is completely covered with field soil. If the root ball is exposed, it will dry out very quickly and the seedling will not thrive. At this stage, overhead irrigation is more effective than drip irrigation, because the plant roots will be too far away from the drip lines. A gentle rainfall is also welcome after transplanting a field.

Tubers, crowns, cloves and sets - Some vegetable crops are grown not from seeds or transplants, but from another plant part. We plant pieces of potato tubers, cloves of garlic, root crowns of asparagus and rhubarb, and sometimes small onions, called sets, to establish these crops in the field. Specific recommendations can be found on how and when to plant these crops, but in general, they can be treated like seeds or transplants.

Choosing Equipment

Small Farm on a Budget - Most small farms start out using a push "plate" seeder for direct-seeded crops. A seeder can save a lot of time and seed compared to hand-seeding. Push plate seeders are relatively inexpensive and easy to purchase. Push seeders typically have interchangeable notched plates that rotate inside the seeder, picking up individual seeds and dropping them through a hole in the side of the seed hopper. Seeders vary in their degree of precision and the number of different seed plates that can be used; prices vary accordingly. Desirable features of a single-row push seeder include: easy to push in a straight line, precise and even seed placement, allows accurate depth adjustment, easy to fill and empty, easy to see the seeds drop.

Hand-transplanting can be fast and efficient for the small, diverse farm. Simple hand tools can be used to make hand-transplanting more efficient and easier. One popular hand tool for transplanting is the Japanese transplanting hoe (hori hori). One Pennsylvania company offers a transplanting tool that is used while standing.

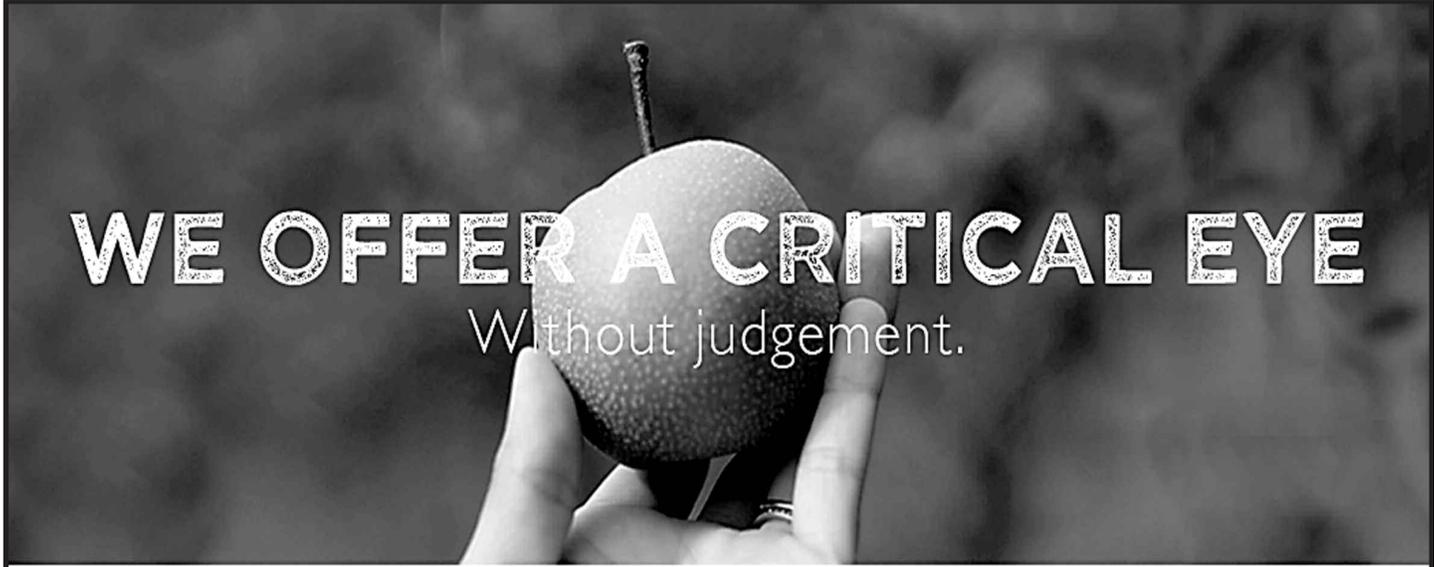
Medium to Large Farm - Four acres seems to be the breaking point where most farms go to tractor-mounted seeders and transplanters. Tractor-mounted seeders control seed spacing with a plate, a punched belt, seed cups, or vacuum systems. Tractor-mounted seeders can save time when seeding over a large area. However, they can take longer to set up for planting.

Tractor-mounted mechanical transplanters are the next step up from transplanting by hand. Mechanical transplanters are not necessarily faster than hand transplanting, at least for small areas. However workers can ride the transplanter, feeding plants into the tubes, for many more hours than they can transplanting by hand. Water-wheel transplanters are very common because of their ability to deliver water and fertilizer directly into the transplanting holes, reducing transplant shock.

Best Practices for Planting

Seedbed preparation - Before planting seeds, it is important to prepare a good seedbed in the field. This will make planting easier and provide a better environment for seeds to germinate and emerge, especially for small-seeded crops such as carrots or lettuce. A proper seedbed is level and even, with no clods of soil or excess plant residue on the surface. Soil should be light and fluffy, with good tilth.

(continued on page 18)



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VEGETABLE PRODUCTION

Seed Vigor in Sweet Corn

Gordon Johnson

Uneven or poor stands may be caused by reduced seed vigor in a specific lot of sweet corn seed. This results in reduced yields in fresh market sweet corn and may cause losses in processing corn if differences in growth are significant.

By its nature, sweet corn has lower stored food reserves compared to field corn. With the advent of different endosperm types than the traditional sugary (su), such as homozygous sugary enhanced (se), shrunken supersweets (sh2), and the more recent augmented shrunken types, vigor became even more of an issue. In general, vigor of sweet corn rated from highest to lowest is: normal sugary su > se heterozygous > se homozygous > sh2 augmented > shrunken sh2. Synergistic sweet gene

Taking it to the Field... (continued from page 17)

Straight Rows - Planting straight rows is much more than a matter of farmer pride. Whether rows are planted by hand, by push seeder, or a tractor-mounted planter, it is essential to make those rows straight. Straight rows are much easier and faster to weed than crooked rows. It is difficult if not impossible to use cultivation equipment to weed a field of crooked rows, and even hoeing is much faster when rows are even and straight.

Row Markers - Rows should be evenly spaced as well as straight. There are a number of ways to mark rows and keep them evenly spaced. Most push seeders will have an adjustable row marker. For transplants on a small scale, a row-marking rake or a push seeder without seeds can be used to mark rows. Some growers use home-made rolling dibblers, either pushed by hand or mounted on a tractor.

Spacing for Good Weed Management - Set up your plant spacing for seeding and transplanting in a way that will make it easier to manage weeds later. Match up the spacing of the weeding tools you will be using (for example, 8-inch wheel hoe, 5-inch hula hoe, or mechanical cultivators) with row spacing. Choose a few plant spacings that work well with your equipment and don't vary them. This will save time adjusting equipment or finding the right sized hoe.

Check the Seeder - No matter which seeder you use, it is worth the time to check and make sure it is functioning properly. Seed tubes can clog up, plates can stop picking up seeds, or the spacing can be wrong. Lift the seeder and turn the drive wheel a few times to make sure seed is dropping down freely. It is also a good idea to go back over a row that has been planted, dig up a few seeds, and check to make sure they are being placed at the proper depth and spacing.

References:

DuPont, T. 2012. Selecting the Right Seeding and Transplanting Strategies - <http://extension.psu.edu/business/start-farming/vegetables/factsheets/selecting-the-right-seeding-and-transplanting-strategies>.

Mid-Atlantic Commercial Vegetable Production Recommendations - <http://extension.psu.edu/plants/vegetable-fruit/production-guides/2015-commercial-vegetable-production-recommendations-guide-for-pennsylvania-1>.

Lee Stivers is with Penn State Extension in Washington Co. From the **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, May 10, 2017.

varieties may have seed with vigor characteristics of a se or a su sweet corn depending on the specific genetics (check with your sweet corn seed company for specifics on the vigor of these hybrids). Supersweet hybrids (shrunken sh2) are noted for having inherently low seed vigor due to reduced food reserves and it has been a standard recommendation to plant these varieties only when soil temperatures are above 60°F.

This inherent lower vigor of sweet corn becomes magnified when a specific seed lot has problems. Sweet corn seed vigor will be affected by seed growing conditions, seed conditioning practices, storage conditions, and length of storage. Seed companies spend significant resources evaluating sweet corn seed for quality (viability and vigor) prior to release and suspect lots are removed from sale. However, seed lots can decline between testing and sales. An acceptable seed lot can become problematic over time.

Sweet corn fields planted with reduced vigor seed will often have uneven stands with healthy plants next to smaller stunted plants. This pattern will often be present across the field. Low vigor plants are less productive and can actually act as weeds in a field, taking resources away from healthy plants and reducing the potential for compensation (producing bigger ears or multiple ears as occurs with remaining plants in fields with stand losses). Reduced vigor seed will produce these field patterns in warm weather but the effects are most severe in cold soils.

Stand reductions are also common with reduced vigor seed. Often, when digging up the seedlings and examining the

(continued on page 20)

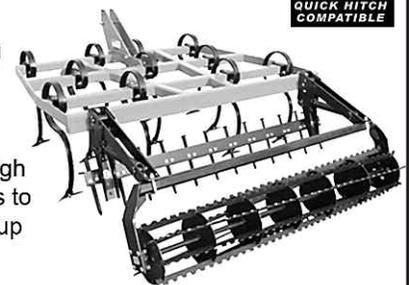
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Improving Early Fruit Set in Seedless Watermelons

Gordon Johnson

The first watermelon plantings have gone in across the region. Markets for early watermelons are normally the strongest so early planting is often more profitable. However, fruit set is often below desired levels in the earliest plantings and crown sets in early plantings often have quality issues such as higher levels of hollow heart.

The following are some considerations for managing watermelons to maximize early fruit set:

1) Get plants off to a good start with a minimum of stress. In early plantings always plant on a warming trend where temperatures are expected to increase and skies are mostly clear. Black plastic mulch will then allow soils to accumulate heat and roots will be able to establish more quickly. Use every row rye windbreaks (or clear row covers if windbreaks have not been planted) to reduce heat losses and protect plants. Plant well hardened off plants and train transplanting crews to handle plants carefully with a minimum of damage. Provide adequate water at planting and avoid putting excess starter fertilizers in transplant water which can cause salt stress on plants. Manage early fields more intensively by monitoring irrigation and fertigation programs so that stress is reduced throughout the growing period. Extra nitrogen can delay flowering so there is a fine balance between promoting growth and initiating flowering. Avoid practices that put extra stress on plants and be careful of phytotoxicities with misapplication of foliar fertilizers, fungicides such as copper products, and herbicides (proper shielding when spraying row middles, follow label guidelines for herbi-

cides). Manage windbreaks so that mites do not infest watermelons when they are terminated. Manage insecticide applications so that bees are not affected during flowering (see pollinator protection information on labels).

2) Manage pollinizer-seedless combinations for maximum pollination potential. Loss of pollenizers after planting will reduce fruit set. This has been a problem in the past when pollenizers were not hardened off properly because they were seeded later in the greenhouse. In-row pollenizers should be used to achieve best early fruit set. Pollenizers should be chosen so that they are flowering adequately as the seedless come into flower. Pollen is the key for early fruit set and earlier flowering pollenizers should be used to improve crown sets. A case can be made also for increasing the number of pollenizer plants for the earliest plantings. A 1:3 ratio of pollenizer to seedless should be the minimum used and extra pollenizers that flower early could be planted at intervals to provide additional pollen. Another issue is the vigor of pollenizers. Make sure that pollenizers have good disease packages. In fields with a history of Fusarium wilt, Fusarium resistance in both pollenizers and seedless is needed. If at all possible, place early plantings in fields with little or no history of watermelon production to avoid soil borne disease stress.

3) Manage pollinators so that pollen is transferred effectively and in adequate quantity. Consider placing extra hives in early plantings. Have hives set when pollenizers are 10% in

(continued on page 20)

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VEGETABLE PRODUCTION

Virus Problems Found in Garlic Early This Year

Gerald Brust

Last year I had an article sometime in July about what I called “garlic viruses” which I had not seen in our area before, but I know must have been around before this. This year some garlic growers are noticing this virus complex already in their fields and I am not sure if that is because they are more aware of it or because the virus complex is expressing itself earlier. Symptoms of virus infection are plants that display yellowing tips on many leaves with some that are completely yellow (Fig. 1). If you look closely at the yellow leaves you’ll see mottling or striping on the leaves (Fig. 2). Symptoms are usually more pronounced on young leaves. Infected plants are stunted and bulb size can be reduced. Garlic crops infected with certain of these viruses are more susceptible to weather conditions like extreme heat, and do not keep well post-harvest.

What I am calling garlic virus is caused by several different viruses that can be grouped under the name “Potyvirus”; all symptomatic garlic that was tested this year was positive for Potyvirus. Some people lump these viruses under the name “garlic mosaic”. In this case garlic mosaic is thought of as a disease caused by one or more viruses belonging to the Potyvirus group which includes onion yellow dwarf virus, leek yellow stripe virus, and others. These viruses can be transmitted through the planting stock or by aphids and it is thought because garlic is clonally propagated probably most of the planting stock is infected with some type of virus. These viruses are usually mild and do not seriously affect yield. The problem comes in when the plants are infected with several different Potyviruses, and then there can be moderate to severe yield reductions. We may have had more aphid movement earlier in the year because of the mild winter and early spring, which may have increased additional virus infections in garlic plantings.

(continued on page 22)

Improving Early... *(continued from page 19)*

bloom so bees start to work fields immediately. If there are not enough bees when first female flowers open, you will lose much of the crown set. Avoid having flowering crops nearby that are more attractive to bees and could siphon off bee activity. Fruit set is often reduced when weather conditions at first flowering is rainy and windy or night temperatures are cold. Honey bees rarely work when the temperature is below 57°F and don’t fly when the temperature is below 55°F. They do not forage in rain or in wind stronger than 12 mph. Cloudiness also reduces flight activity, especially near threshold temperatures. A cold spell in June can reduce fruit set significantly because of reduced bee flights. While honey bees can work over a 2 mile distance, a case can be made for placing honey bee hives at more than one location in or around the field in early plantings to address shorter flights in bad weather. Bumblebees are stronger fliers that can fly in heavier winds and are active at lower temperatures. Placing bumblebee hives throughout the field may improve early fruit set. Growers should be cautioned not to place bumblebee hives near honeybees because the honeybees will place stress on and rob from the bumblebee colonies if both honey bees and bumblebees are used.

Dr. Johnson is the Extension Vegetable & Fruit Specialist with the Univ. of Delaware. From the Weekly Crop Update, Univ. of Delaware, Vol. 25, Issue 5, April 28, 2017.

Seed Vigor... *(continued from page 18)*

seed remnants and mesocotyls of stunted plants, the kernels will be disintegrated and there will be darkening at the mesocotyl attachment. This means that the seeds deteriorated prematurely and the full content of the food reserves in the seed were not available for seedling development leading to the stand and vigor issues.

Seed viability is measured with a germination test which is done under optimum temperature, moisture, and light conditions. However, germination tests do not directly measure seed vigor, and seed vigor declines before germination is reduced. Therefore, it is possible to have seed that will germinate in a field but be of low enough vigor that sweet corn plants do not grow properly.

If a seed lot is suspected of having low vigor, then seed vigor tests are recommended. Testing for vigor is also very important for carryover seeds or seeds stored for long periods in unfavorable conditions. Seed vigor testing is also useful when troubleshooting fields where seed vigor issues are suspected (testing left-over seed).

Tests that are used to evaluate seed vigor that are available from different state and private seed laboratories include:

The Cold Test – Seeds are germinated using a specific cold, moist treatment regime. This will be useful in selecting those lots that will perform the best under early cold soil conditions.

Seedling Vigor Classification Test (SVCT) – In this test seedlings from a normal germination test are rated visually according to vigor (strong or weak). Visual ratings are based on if the seedlings have normal developmental characteristics in all seedling plant parts. With sweet corn this would be the roots, the mesocotyl, and the coleoptile. In low vigor seed one or more of these parts will be abnormal. This is a good test to troubleshoot suspect low vigor seed lots.

Tetrazolium (TZ) Test – This is a quick biochemical test that essentially stains living tissue in a seed a red color. The more red staining, the more viable the seed. This test is good for spotting lots with significant differences in vigor between seeds.

Accelerated Aging Test (AAT) – In this test, seed is put under a high temperature and humidity regime for a period of time and then is evaluated using a standard germination test. This is often used to check the storability of seeds under less than ideal conditions but also will do a good job of evaluating seed vigor. Modifications to the Accelerated Aging Test have been made to do a better job of evaluating sweet corn types such as shrunken sh2 varieties.

Electric Conductivity Test – This test measures cell membrane integrity which is correlates well with seed vigor and sweet corn seed emergence. As seeds age and cell membranes deteriorate, cell contents leak, the more leakage, the higher the electrical conductivity and the lower the seed vigor. This is most useful in comparing different lots after extended storage.

Most seed companies also grow out sweet corn lots in field tests prior to sales (commonly in winter nurseries) to confirm results from germination and vigor tests that have been performed.

Dr. Johnson is Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the Weekly Crop Update, Univ. of Delaware, Vol. 25, Issue 7, May 12, 2017.

Ethylene Problems in a Few Vegetable High Tunnels

Gerald Brust

In Maryland we have seen a few problems with ethylene interactions with tomatoes in high tunnels. Ethylene (C₂H₄) occurs in trace amounts in gasoline and natural gas and is produced when these substances are burned. It is present in wood and tobacco smoke. Ethylene is also a plant hormone produced by plants during their growth and development. However, ethylene produced through defective heating equipment can be detrimental to protected crops, because the ethylene is produced in much greater quantities. Ethylene pollution influences the activities of plant hormones and growth regulators, which affect developing tissues and normal organ development, many times without causing leaf-tissue damage.

Injury to broad-leaf plants occurs as a downward curling of the leaves and shoots (epinasty); some growers think that this is wilting in the plant and look for root or irrigation problems that are not there. But a wilting plant is flaccid or soft and droopy with the leaves collapsed, while in epinasty the plant is turgid and firm, but with the leaves turned down (Fig. 1). How bad the down-turning of leaves is depends on the tomato variety, temperature, ethylene concentration, and the duration of exposure (see study by M. Jones at: <http://u.osu.edu/greenhouse/2014/04/21/preventing-ethylene-related-losses-during-the-postproduction-care-and-handling-of-greenhouse-crops/>). The epinasty then can be followed by stunting of growth.

Other symptoms of excess ethylene exposure include the abscission of flowers (Fig. 2), petals or leaves; water-soaking of older leaves; chlorosis; and wilting of flowers. Crops vary in their

sensitivity and response to ethylene toxicity. High temperatures and high light levels will increase the severity of ethylene damage. In high tunnels that burn propane, kerosene or use motors that burn gasoline and have poor or no ventilation, even minute amounts of this pollutant can cause some damage to tomatoes. Symptoms of ethylene damage can be subtle, especially if there are no plants grown in non-polluted air for comparison. Often times the damaged tomatoes show up in unexpected areas of a high tunnel—sometimes in the middle of the high tunnel with a group of 5-10 plants affected and no tomato plants around them with any symptoms. This is due to the patterns of air movement in high tunnels that are passively vented and not as predictive as in actively vented situations. At times air patterns can concentrate the ethylene in certain areas one week and then in different areas the next week, making diagnoses of the problem difficult.

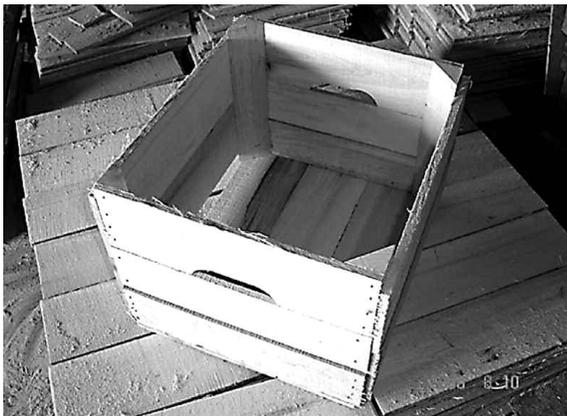
Proper heating system installation and maintenance are the best ways to prevent problems. Propane flames should have a small yellow tip when properly adjusted and natural gas flames should be a soft blue with a well-defined inner cone. To ensure proper combustion, heater units should have a clean air intake and should be vented to the outside with a stack, which keeps exhaust gas from being drawn back into the greenhouse through the ventilation system.

(continued on page 22)



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VEGETABLE PRODUCTION

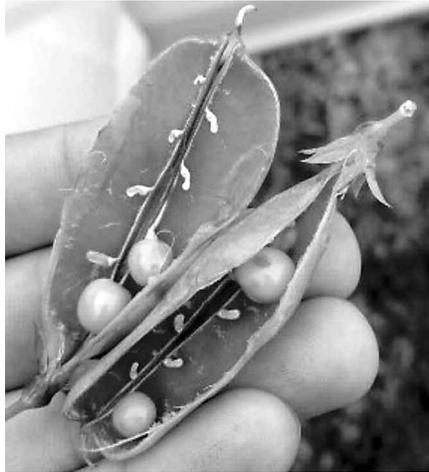
Reduced Seed Set in Peas

Gordon Johnson

There have been a number of early pea fields with reduced seed set. Pods developed but only one or two seeds were formed.

Reduced seed set is often related to flower development and pollination. Peas are self-pollinated. As the flower opens, the pollen from the anthers is released to the stigma of the pistil of the same flower. Once on the pollen is on the stigma, the pollen germinates and a pollen tube is formed and then grows down the style and when it reaches the ovule, the egg is fertilized by one of the two sperm cells, the other fuses with polar nuclei to become the seed endosperm. During the development of the pollen tube, plant hormones are released which are also essential for seed set.

Seed set problems therefore may be related to lack of pollen formation, pollen that does not release to the stigma, reduced pollen germination, abnormal pollen tube development, abnormalities in the stigma or style, or abnormalities in the ovule. Lack of Gibberellin hormone release has also been shown to reduce seed set or lead to early seed abortion in peas. Stress to peas just after flowering has been shown to cause seed abortions.



Pea pods with reduced seed set. Affected fields yielded 1000 lbs/a while nearby unaffected fields yielded near 4000 lbs/a.

What are the potential causes of reduced seed set in peas? Frost or freeze when flowers are opening has the potential to injure pollen or directly damage flower parts. Peas are very cold tolerant normally but are susceptible to injury at flowering. Our last freeze event on Delmarva was on April 9 where temperatures dropped to below 30°F at some locations. Fortunately, early peas were not in flower during that time.

Research has shown that peas under temperature and moisture stress produce fewer seeds. Experiments have shown that temperatures at 93°F or above can also reduce seed set in some varieties of peas. Dry soil conditions will magnify this effect. We had temperatures at 90°F in some locations on April 29 with upper canopies approaching critical temperatures during flowering.

Another factor to consider is timing of chemical applications to peas – applications near and at flowering may damage pea flowers under certain weather conditions and reduce seed set.

Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware, Vol. 25, Issue 9, May 26, 2017.

Ethylene Problems... (continued from page 21)



0 0.01 0.1 1 10
Ethylene Concentration ($\mu\text{L}\cdot\text{L}^{-1}$) M Jones, OSU

Figure 1. Tomato plants with a downward curling of leaves (epinasty) due to different levels of ethylene exposure.



Figure 2. Flower abortion on a tomato plant exposed to ethylene in a high tunnel.

Dr. Burst is IPM Specialist in Vegetables at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware, Vol. 25, Issue 5, April 28, 2017.

Virus Problems... (continued from page 20)

Figure 1. Garlic plants showing symptoms of infection with virus complex.



G Brust



G Brust

Figure 2. Striking, striping on leaves of garlic infected with virus complex.

You cannot reduce virus transmission by spraying pesticides. Any garlic with symptoms should be watched and possibly harvested early or rouged out if yellowing and decline increase in the coming weeks.

Dr. Burst is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware, Vol. 25, Issue 8, May 19, 2017.

Dickeya dianthicola Update

Kate Everts

Several plants with **suspected** *Dickeya dianthicola* symptoms have been reported in the mid-Atlantic region in spring 2017 and sent for diagnosis. The results of the tests are still pending. Growers should be vigilant in scouting their fields. If you see any suspect symptoms of blackleg, or your potatoes had poor emergence, or you believe that you have *Dickeya* in your field, it is important to submit the plants for diagnosis. Suspect samples should be sent for testing to your county extension educator or to Dr. K. Everts (keverts@umd.edu), or Dr. N. Kleczewski (nkleczew@udel.edu) for submission to a diagnostic lab. Remember that this disease results from infected seed pieces. We have no evidence that the bacterium can overwinter in soils here in the region, which means it is introduced to field through infected seed pieces.



Figure 1. Potato plant exhibiting symptoms of *Dickeya dianthicola* infection. Note darkened aerial stem lesions.

In addition to testing, it is important that you have your seed health certificate. This certificate will indicate the source of your potatoes and the lot of origin. Information on best management practices for buying seed can be found here: (<http://vegetableonline.ppath.cornell.edu/NewsArticles/Potato%20Dickeya%20recommendations-Northeast-2017.pdf>)

Dr. Everts is the Vegetable Pathologist at the Univ. of Delaware and the Univ. of Maryland. From the Weekly Crop Update, Univ. of Delaware, Vol. 25, Issue 7, May 12, 2017.

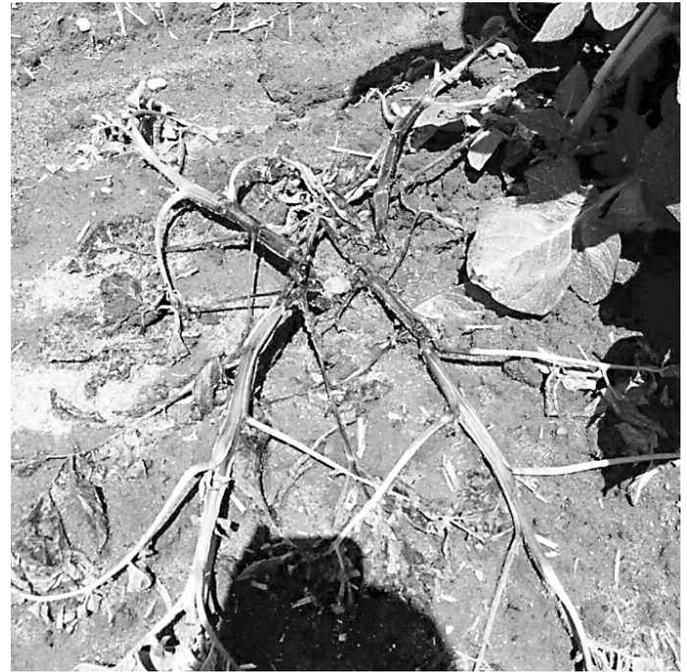


Figure 2. Potato plant exhibiting symptoms of *Dickeya dianthicola* infection. Note lesions emanating from the soil line

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POTATO PRODUCTION

Fertility Considerations for Potatoes

William Lamont

The following should be considered when developing a fertilizer program for potato production.

pH

pH is an important factor in any fertilizer program and in controlling common scab. As pH increases to near 6.0 plant nutrients also increase and toxic elements become less available, thereby providing optimal growing conditions from the standpoint of nutrients. Where scab is not a problem, pH levels should be as high as possible (up to 6.0). Soil pH should be between 5.0 and 5.2 to control common scab. Scab resistance varieties should be grown at high pH levels. Potato breeders are working on developing scab resistance lines and in the future hopefully we will not have to adjust the pH downward to control common scab.



Photo: iStockphoto.com

Salts

The carriers of nitrogen and potassium are the primary fertilizer components that create salt problems. Salts are a factor when high concentrations of fertilizers are applied in bands, as they are in potato production, and applied under optimal soil moisture conditions and then conditions turn dry. The salts in the fertilizer bands move with the soil moisture to the surface and concentrate causing root "burn" thereby retarding emergence and subsequent growth. The potential for salt injury is greatest in sandy soils and when fertilizer is placed close to seed pieces.

Specific Nutrients

Nitrogen - Results from fertilizer experiments over the years have shown that rates between 150 and 175 lbs N/A are adequate for maximum economic yields of commonly grown varieties. Excess nitrogen delays tuber initiation and maturity thereby potentially reducing the yield of early harvest and increasing the potential for skinning and bruising of main season varieties. Applying between 75 and 120 lbs N/A in bands at planting is a conservative amount of nitrogen to apply. Applying more than that increases the potential for groundwater contamination by leaching nitrogen out of the root zone. The at-planting amount of nitrogen can be supplemented by top dress or side dress nitrogen when plants are approximately 4 to 8 inches tall. This would give the most efficient application of nitrogen as well as minimize the threat of groundwater contamination.

Phosphorus - Phosphorus levels in most potato soils are quite high. However, because pH levels are near 5.0 or below in many potato soils a considerable amount of phosphorus is not available. Increasing the pH to 5.2 to 5.5 improves phosphorus efficiency in the soil. Where pH and/or soil phosphorus levels are low or when iron plus aluminum levels are greater than 200 lbs/A, phosphate applications should range from 200 to 240 lbs/A. If the pH is greater than 5.2 and phosphorus (P_2O_5) levels are high, the amount of phosphate to apply should range between 120 and 200 lbs/A.

Potassium - Many potato soils are naturally low in potassium. However, fields that have been in potatoes for many years

may have high potassium levels. If potassium levels are low, growers should consider applying at least some potash (K_2O) as a pre-plow or pre-plant broadcast application. Keeping potash levels relatively low in fertilizer bands decreases the potential for fertilizer salt injury. Potash should be applied at approximately 150 lbs/A in field that have high potassium levels and at 240 lbs/A in fields where potassium levels are low. When high rates of potash are needed, broadcast one-half prior to planting and band the other half.

Magnesium - Potatoes have a relatively high demand for magnesium. If a soil is at least 5.0 or magnesium levels are greater than 100 lbs/A, magnesium is not needed in fertilizer bands. At pH levels below 5.0 or when soil magnesium are less than 100 lbs/A, 30 lbs/A of elemental magnesium (50 lbs of MgO/A) are recommended.

Calcium - Currently there is considerable information about the benefits of calcium for potatoes. The key factor for proper calcium nutrition in potatoes is a combination of having adequate calcium in the soil and optimal moisture through the growing season. The best way of having adequate calcium in the soil is to apply lime to bring the pH to acceptable levels. Another means of applying calcium to the soil is to apply gypsum (calcium sulfate). Gypsum supplies calcium without changing the soil pH. (An application of 1400 lbs of gypsum will supply approximately 300 lbs calcium/A.) Foliar applications of calcium and sidedress applications of calcium nitrate (at rates commonly applied in the Northeast) do little to provide adequate calcium for plant nutrition. To get the full benefit from calcium the element needs to be in the zone of tuber formation and moisture needs to be maintained at optimal levels through the growing season.

*Dr. Lamont is with the Department of Plant Science at Penn State Univ. From the **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, April 27, 2017.*

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BERRY PRODUCTION

Strawberry Planting and Other Basics

Kathleen Demchak

A successful strawberry planting hinges on getting the basics right at planting time. If you can pay attention to the basics, you are well on your way to having a vigorous planting.

Here are a few of the things that are most important when it comes to establishing a healthy planting:

Soil conditions - Working the soil when it's not quite dry enough is probably one of the worst things you can do for your strawberry plants. In a friable soil with good structure, the plants' roots will make good soil contact, which allows plants to take up the moisture and nutrients that they need to grow.

Plants planted in cloddy soils just won't grow well, in part because of poor root contact, but also because it is difficult to set the plants at the correct height. Either the plants settle too much, and soil washes into the crown making it rot, or the plants end up perched too high, and the roots become exposed and dry out. Neither scenario ends well. And of course, improving the soil organic matter content is something that helps with soil structure and drainage, so that is something to factor into crop rotations for the long haul.

Moisture! - This means making sure beds are trickle-irrigated in plasticulture plantings before planting, and then giving them a day or two to drain before planting. Planting is a lot easier when the beds are nicely moist, not dry or sopping wet. Keeping the plantings well-watered in dry spells will allow the plants in matted-row plantings to produce enough runners to fill in the beds, and will make it easier for the runners to root. It will also keep those plasticulture plants humming along.

Planting stock - One critical point with dormant plants is to leave the plants at the nursery until you are ready to plant, unless you have storage facilities that don't have apples in them and where the plants can be kept very cold (30-31 degrees). If the plants are held at warmer temperatures for even a couple of extra weeks, they are using carbohydrate reserves just to stay alive that they should have been putting into growing leaves and roots, plus they tend to send out leggy leaves that get broken off at planting.

A second point is to order a few more plants than you need, and give yourself the option of discarding very small ones. It



Different dormant plant sizes. Photo: K. Demchak, Penn State

seems that some smallish plants often are in the orders, but very small weak plants seen to spend a good part of the summer growing to the size they should have been in the first place, when instead they should be producing runners to fill in the row in matted-row plantings, and branch crowns to increase yields in plasticulture ones. In matted-row plantings, those early-rooting daughter plants will provide much of the yield for the following year.

In plasticulture, a higher proportion of the small plants don't survive if planted, and those that do produce lower yields, resulting in a decrease in overall yields. It takes just as much (or more) time and money to take care of a partially filled weak bed as it does to take care of a vigorous one, and the pay-back is worse. In this photo, the two plants on the left would be fine to use, while the one on the right, only measuring about 2" in diameter, is too small.

Nitrogen (in moderation) - Notice that your plants aren't looking so green, or aren't growing all that well? First, makes sure there is sufficient moisture in the soil, and if lack of moisture isn't the problem, 20-25 or so pounds of nitrogen per acre in matted row plantings, along with enough water to give the plants a good drink, often makes them jump. Apply the recom-

(continued on page 27)

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GREENHOUSE PRODUCTION

What You Need to Grow Healthy Transplants

Lee Stivers

Many vegetable crops are started in the greenhouse as transplants, and then planted out into the field for crop production.



Photo: Tianna Dupont

In Pennsylvania, vegetable crops that usually start as transplants include tomato, pepper, eggplant, broccoli, and cabbage. Squash, cucumbers and pumpkins are also commonly started using greenhouse transplants. Producing quality transplants in a greenhouse requires healthy seed, a suitable potting mix, clean planting trays, fertilizer and water.

Healthy Seeds - Purchasing seed that is as disease-free as possible is an important step in producing transplants that are vigorous and healthy. Many of our vegetable disease problems, including bacterial and viral diseases of tomato and pepper, can start in the greenhouse from infected seed. When infected transplants are planted in the field, these diseases can cause considerable crop loss later in the season. It is recommended to buy disease-indexed seed when available from your seed supplier. In some cases, hot water baths or chlorine rinses can be used to reduce pathogenic bacteria on the surface of seeds such as tomato, pepper, and cabbage. However, hot water treatments must follow strict time and temperature steps or seeds may be injured.

Potting Mixes/Growing Media - A suitable potting mix (also called "growing media") will support developing seedlings by providing air, nutrients, water, and a place for roots to grow. Most potting mixes are soilless to avoid soil-borne diseases and promote good drainage. A mix of peat moss, vermiculite or perlite, and sometimes fertilizers, can provide a suitable environment with sufficient water-holding capacity, nutrient content, and aeration for plant growth and development. Clean, finished compost can also be added to potting mixes. Compost adds organic matter to the mix and supports beneficial microbes that can suppress soil-borne diseases.

Commercial Mixes - Numerous commercial mixes are available for conventional and organic growers. Most of these mixes will produce high quality transplants when used with good management practices. Commercial growing media will have added lime and may or may not have fertilizer added. Certified organic growers can find commercially available potting mixes that are organic. Check labels carefully to make sure you know what the ingredients are in a commercial mix and check to see

if it is listed by the Organic Materials Review Institute (OMRI). It should state "OMRI listed" on the packaging.

Making Your Own Mix - Growers sometimes prefer to make their own potting mix. Advantages of making one's own mix may include uniform and consistent composition, flexibility for making special mixes, and possibly lower cost. The ingredients of soilless mixes (peat, vermiculite, perlite, plus lime and fertilizers) are available to purchase separately. Compost can be purchased or produced on-farm. There are many recipes for conventional and organic growing mixes, but a commonly used one is:

- 50-70 percent sphagnum peat
- 25-50 percent vermiculite
- 5 lbs ground or superfine dolomitic lime per cubic yard of mix
- plus added fertilizers

Flats and Trays - Flats and trays used in the production of transplants should be new to avoid pathogens that cause damping-off and other disease problems. If flats and trays are reused, they should be thoroughly cleaned after use and disinfected using a chlorine solution or a Q-salt product (for example, products such as Greenshield, Physan and Prevent). Allow flats and trays to dry completely before reuse.

Most vegetable transplants are grown in plastic trays with individual cells for each plant. Trays vary in size from 32 cells to over 500 cells per standard 12 x 24 inch tray. Larger cell sizes (32, 50 or 72) are best for vine crops (squash, melons, cucumbers and pumpkins). Tomatoes, peppers and eggplants do well in 72 and 128 cell trays. Small cells (128, 200, 288) are suitable for onions and lettuce.

Water and Fertilizer - Throughout seedling growth, keep the potting mix moist but not continually wet. Water less in cloudy weather, and try to water in the morning so that plant surfaces dry out before the end of the day. If you are growing plants in media without added fertilizer, you will need to water with added liquid fertilizer once the seedlings have emerged. Plants grown in media with added fertilizers will require liquid fertilizer starting 3-4 weeks after emergence. Use a fertilizer that is formulated specifically for greenhouse transplants: it should be completely soluble in water, lower in P (phosphorus) than N (nitrogen) and K (potassium). Follow fertilizer recommendations for application rate (concentration) and frequency carefully. Too little fertilizer will slow plant growth; too much fertilizer can cause excessive growth or burning of the plants.

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- Potting Media and Plant Propagation, Penn State Extension Start Farming, <http://extension.psu.edu/business/start-farming/vegetables/factsheets/potting-media-and-plant-propagation>.

*Ms. Stivers is with Penn State Extension in Washington Co. From the **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, April 27, 2017.*

BERRY PRODUCTION

CLASSIFIEDS

Strawberry Planting... (continued from page 25)

mended fertilizer rates (according to your soil test results, of course!) at planting, and then fertilize when the first runners start being produced, and again in mid-August. In plasticulture plantings of June-bearers, the rule of thumb is still 60 pounds per acre of nitrogen pre-plant incorporated before planting, and 30 pounds of nitrogen per acre in the spring. For day-neutrals, 60 pounds per acre pre-plant and 1 pound of nitrogen per acre per week during the growing season has worked well.

The bottom line is that if the planting starts out vigorous, you won't have to spend money and time trying to coax it along later. Chances are that the plant growth will outpace much of the damage from diseases and insects, and competition from weeds. All of this together makes planting care easier in the long run, and helps ensure a good return on your investment.

*Ms. Demchak is with the Department of Plant Science at Penn State Univ. From the **Vegetable, Small Fruit and Mushroom Production News**, Penn State Extension, extension.psu.edu/plants/tree-fruit/new/2017/, April 28, 2017.*

Leggy or Stretched Watermelon Transplants

Gordon Johnson

Watermelon transplants that have an extended hypocotyl, that area of the stem below the cotyledons (seed leaves), can be more susceptible to damage during and after transplanting. Additional stretching of the epicotyl and internodes above the cotyledons can also occur, causing further problems in planting and with plant survival. What is desired is a compact plant with a short hypocotyl.

Causes of Plant Stretch:

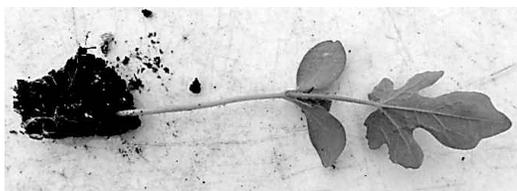
Leaving plants in the germination chambers too long. Trays should be moved from germination areas to growing areas before the cotyledons emerge.

Cloudy weather. Stretch is greater during cloudy conditions. High light reduces stretch. Make sure greenhouse films have high light transmission and replace film more often in transplant houses.

Overcrowding and shading. Overcrowding is hard to avoid with trays tight together. However, shading can be limited by having clear end walls; making sure other structures, shrubs and trees do not produce shade; and limiting shade from above and around the plants.

High daytime temperatures and large differences between day and night temperatures. Keep houses cooler in the daytime to reduce stretch.

Watering program (watering too much). Keep plants on the dry side to avoid stretch and avoid overwatering. *High phosphorus fertilizers. Keep phosphorus levels low in greenhouse fertilizers to avoid stretch.*



Stretched watermelon transplant with elongated hypocotyl.

*Dr. Johnson is Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware, Vol. 25, Issue 7, May 12, 2017.*

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POTATO PRODUCTION

Sweet Potatoes and Plasticulture?

Gordon Johnson

Sweet potatoes are planted from the end of May through the middle of June in our region. Commonly production is on ridges in conventionally tilled soil. I was recently asked about the potential to plant sweet potatoes using plasticulture (plastic mulch and drip irrigation). While not common in our region because of the cost, this has been a practice used further north where season extension is needed for production.

Lay 4' black plastic mulch with 3' bed top, and on 6' centers. On each bed, two rows can be planted with 9-12" between plants in the row and 18-24 inches between rows. Waterwheel transplanters can be used but it is important to get several nodes in the ground as crews place the slips. Plant at depth of 3 inches with no less than 2 plant nodes in the ground and leaving at least 2 leaves or more above the ground. This is often difficult to do while riding the transplanter and it may be necessary to create the holes with the waterwheel and then go back and hand set the plants at the proper depth.

At the end of the season, for mechanical digging it will be necessary to mow the tops and then remove the plastic. Sweet potato yields in plasticulture have been excellent in our region – similar to or better than bare ground.

*Dr. Johnson is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware, Vol. 25, Issue 9, May 26, 2017.*

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