

Needed: Nominations for PVGA Directors

The terms of six members of the PVGA Board of Directors expire at the Annual Meeting scheduled for Wednesday, January 31, 2018, at the Mid-Atlantic Fruit and Vegetable Convention in Hershey. The Directors whose terms expires are:

Brian Campbell – Berwick – first elected 2007
Eric Oesterling – New Alexandria – first elected 2015
Michael Orzolek – State College – first elected 2015
Thomas Strzelecki – Peckville – first elected 2012
Randy Treichler – Three Springs – first elected 2015
Mark Troyer – Waterford – first elected 2015

All would be eligible for re-election under the 18-year term limits set by the Board however Mr. Treichler has indicated he does not wish to run for re-election.

Like last year, the election will be conducted by a mail-in ballot that will be mailed to all members with the dues renewal notices in late November/early December. The Leadership and Recognition Committee will be seeking additional nominees to be included on the ballot. Members who want to nominate someone for Director, or who would like to be considered, should contact the PVGA office at 717-694-3596 or pvga@pvga.org or Robert Shenot, who as Past President serves as chair of the Committee at rshenot@consolidated.net.

2018 Mid-Atlantic Convention Opens January 30

The 2018 Mid-Atlantic Fruit and Vegetable Convention will be held January 30 to February 1, 2018, at the Hershey Lodge and Convention Center in Hershey, Pennsylvania. Over 2,100 fruit, vegetable, and berry growers and other industry persons from throughout the mid-Atlantic region and beyond are expected to attend. This year's convention will again feature several pre-convention workshops, a farm market bus tour, and a trade show with over 170 exhibitors plus three full days of seven or more concurrent educational sessions.

The day before the main Convention opens, growers can chose between a bus tour of Pennsylvania farm markets or several different workshops. The workshops include FSMA Grower Training, Biocontrols, Computer Record Keeping, Urban Community Farming, Farm Market Business Management, and Pennsylvania Pesticide Applicator License Training.

The Mid-Atlantic Convention has been jointly sponsored by the State Horticultural Association of Pennsylvania, the Pennsylvania Vegetable Growers Association, the Maryland State Horticultural Society and the New Jersey State Horticultural Society for the past 40 years. In 2014, the Virginia State Horticultural Society also began meeting at the

PVGA Young Grower Award Applications Being Accepted

The "PVGA Young Grower" award was a new award established this year. Brandon Christner was the first recipient at the 2017 Mid-Atlantic Convention. The winner is chosen each year by the PVGA Leadership and Recognition Committee. PVGA members are asked to nominate a young grower (someone they know or themselves) who meets the criteria for the Award. The criteria are as follows:

- is a PVGA Member who is 35 years old or younger;
- has been successfully growing vegetables, potatoes or berries for less than five years; and
- has contributed to advancing or promoting the Pennsylvania vegetable, potato or berry industry.

The prize for the winner will be free registration and lodging for the 2018 Mid-Atlantic Fruit and Vegetable Convention. To nominate someone or yourself, send a brief but comprehensive description of the farm operation and the nominee's qualifications to PVGA at pvga@pvga.org or 815 Middle Road, Richfield, PA 17086, by November 30, 2017.

Convention as well. The Pennsylvania State University, University of Maryland, Rutgers University Cooperative Extension and Virginia Tech University all assist in organizing the three days of educational sessions.

The Convention has become one of the premier grower meetings in the Northeast. The Great American Hall and the Aztec Room at the Hershey Lodge and Convention Center will host the Trade Show. Several additional exhibitor booths will be added in the lower level lobby area this year. Specialized horticultural equipment, farm market merchandise, and packaging will all be on display along with information on the latest seed varieties, fruit varieties, pesticides and other supplies and services for the commercial grower.

Many pesticide applicator update training credits will be available to Pennsylvania, Maryland, New Jersey and Virginia growers attending the sessions. The program covers nearly every aspect of fruit, vegetable, potato and berry production. Commercial growers should not pass up this terrific educational opportunity. Further details about the Convention will be published in upcoming newsletters.

NEWS



**Pennsylvania
Vegetable Growers
Association**

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

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Ag Guestworker Bill Being Introduced

Rep. Robert Goodlatte of Virginia has released the draft of his Agricultural Guestworker Act (called the Ag Act) which he will be introducing into Congress. It would create a H-2C guestworker program to replace the current H-2A program. Following is the Judiciary Committee summary of the Act which will in all likelihood be amended as it works its way through the Committee and the House of Representatives.

Federal Agencies to Run H-2C Program - Departments of Agriculture (USDA), Homeland Security (DHS) and State (DOS).

Admittance to the U.S. - A grower must petition for an H-2C worker before the worker can be admitted to the U.S. An H-2C worker may switch to another grower as soon as the other grower files its own petition for the worker (or hires the worker "at-will", as described below). In addition, if an association of growers petitions for an H-2C worker, the worker may be transferred among the association members.

At-Will Employment - Under the "at-will" component of the H-2C program, growers can employ H-2C workers without first having to petition for them. To do so, growers must be designated as registered agricultural employers by USDA and must agree to abide by the terms and obligations of the H-2C program as if they had filed petitions. H-2C workers can only seek at-will employment if they have already been admitted to the U.S. through an H-2C petition and have completed the agreed-upon period of employment with their initial employer or have been terminated by their original employer. Registered agricultural employers and H-2C workers may voluntarily terminate at-will employment at any time. The H-2C worker must then find additional at-will or petition-based employment within 30 days or leave the U.S.

In order to ensure that at-will H-2C workers do not seek unlawful nonagricultural employment, the at-will component will only become available once all U.S. employers are required to use E-Verify and the system is able to indicate whether a worker is eligible to be employed in all occupations or only to perform agricultural labor.

Length of Stay - The maximum period of stay for H-2C workers in temporary or seasonal jobs is 18 months, after which they must remain outside the U.S. for a period equal to at least 1/12 of the duration of their stays on H-2C visas. H-2C workers in jobs that are themselves permanent can initially work for up to 36 months before having to leave the U.S. If a worker's absences from the U.S. during the period of admission accumulate to 45 days, they will be considered to have met their obligation to remain outside the U.S. following their stay.

Enforcement of Program Conditions - Attestation-based. USDA will be responsible for ensuring grower compliance.

Non-Seasonal Employers - Dairies, food processors and other agricultural employers may use the H-2C program to fill jobs that are not temporary or seasonal.

Recruitment of U.S. Workers - An employer must place a local job order with the state workforce agency serving the local area where H-2C workers will be employed, which shall post the job order on its website for a minimum of 30 days (and the Department of Labor shall include links to the official websites of all state workforce agencies on its website).

Wages - Employers must pay H-2C workers wages of not less than the State or local minimum wage, or 115% of the Federal minimum wage, whichever is greatest.

Escrow Account - To ensure that H-2C workers abide by the length of stay limitations, employers shall withhold 10% of their wages and transfer the withheld funds into a trust fund. The workers can pick up the escrowed amounts at a U.S. embassy or consulate in their home countries - should they fail to do so, the forfeited funds will assist in the enforcement of the immigration laws. Shepherders are exempted from provision, as are commuter workers who return to their home country each day.

Social Security and Unemployment Insurance - Employers of H-2C workers in jobs that are not temporary or seasonal shall pay to the Federal government an amount equivalent to the Federal Social Security and Unemployment Insurance taxes on the wages paid to H-2C workers that the employer

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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

Reminder: New Form I-9 Must Be Used After Sept. 18

Farms and other businesses that employ workers should be aware that beginning Sept. 18, the newest version of Form I-9 must be used to verify the identity and employment authorization of employees when they are hired. U.S. Citizenship and Immigration Services published the new form in July. After Sept. 18, employers can no longer use the older version of the form and must use the version dated 07/17/17. Changes include minor wording tweaks and the inclusion of Consular Report of Birth Abroad as one of the documents that can be accepted to establish employment authorization. Employers must use Form I-9 for all employees they hire and the forms are a major part of government labor inspections and compliance visits. For more information, visit www.uscis.gov/i-9-central.

From Farm Bureau Express, Penna. Farm Bureau, September 8, 2017.

USDA Gearing Up for Census of Agriculture

The U.S. Department of Agriculture is getting ready to send out the 2017 Census of Agriculture at the end of the year. Conducted every five years, the questionnaire collects comprehensive data about agriculture in every county in the nation. Those figures help highlight agriculture's importance to the local and national economies. The data is used by farmers and agribusinesses for planning and by legislators and policy makers for developing agriculture policy, such as the farm bill, and designing programs that help farmers and other residents of rural areas. USDA will mail the surveys to farms in December and responses are due back - either via mail or online - in February. Responding to the Census is required by law. For more information, visit: www.agcensus.usda.gov.

From Farm Bureau Express, Penna. Farm Bureau, September 8, 2017.

NAFTA Negotiations Continue

Representatives from the U.S., Canada and Mexico this week finished their second round of negotiations over revamping the North American Free Trade Agreement (NAFTA). While the negotiations in Mexico City wrapped up with some major sticking points still unresolved, the talks are ongoing with another round of negotiations scheduled for later this month in Canada. Farm Bureau has advocated for modernizing NAFTA and not pulling out of the pact. U.S. agriculture has overwhelmingly benefited from NAFTA. More than 25 percent of U.S. agricultural production goes to foreign markets and the U.S. exported \$130 billion in agricultural products in 2016 alone. "When it comes to overall positive results for North America's farmers and ranchers, NAFTA has proved itself as a solid foundation for trade," American Farm Bureau Federation President Zippy Duvall said. "Just as farmers have new tools and technology for food and fiber production, we believe that an updated NAFTA agreement can help the three nations become even stronger trading partners." Farm Bureau's priorities for a modernized NAFTA include: Updated, science-based sanitary rules; improved dispute settlement procedures for fresh produce; eliminated or reduced Canadian tariff barriers to dairy, eggs and wine; resolution to the misuse of geographical indicators; and a consistent, science-based approach to biotechnology.

From Farm Bureau Express, Penna. Farm Bureau, September 8, 2017.

Fund Established to Help Farmers and Ranchers Affected by Hurricane Harvey

Texas Farm Bureau has established a relief fund to help farmers and ranchers recover from agricultural losses they suffered when Hurricane Harvey pummeled parts of Texas with high wind, unprecedented rainfall and flooding. The storm hit a part of the state known for cattle, cotton, rice and other row crops during harvest time. "Texas agriculture suffered major losses," Texas Farm Bureau President Russell Boening said. "Some of that will be covered by other means, but much of it will not. Farmers and ranchers are left to pick up the soggy pieces." All donations collected through the fund will be dispersed to farmers and ranchers affected by the hurricane through an application process. Donations are tax deductible and can be made online at: <http://texasfarmbureau.org/texas-farm-bureau-hurricane-harvey-relief-effort>. Checks can be mailed to: Texas Farm Bureau Agriculture Research and Education Foundation; Hurricane Harvey Relief Fund; P.O. Box 2689; Waco, TX 76702-2689; Attn: Cyndi Gerik. Donations of hay and feed are also being accepted. Before collecting or delivering supply donations, please contact the AgriLife Animal Supply Point hotline at 979.845.7800 to confirm needs and coordinate delivery.

From Farm Bureau Express, Penna. Farm Bureau, September 8, 2017.

Ag Guestworker... (continued from page 2)

would have been obligated to pay had the H-2C workers been eligible for these programs. The funds shall be provided to USDA, DHS and DOS to reimburse them for expenses incurred in administering the H-2C program.

Transportation Expenses - Employers are not required to reimburse H-2C workers' transportation expenses

Housing - Employers are not required to provide housing to H-2C workers.

Arbitration and Mediation - In order to discourage abusive litigation, growers and H-2C workers can agree to binding arbitration and mediation of any grievances. In addition, civil actions for damages cannot be brought against employers unless at least 90 days prior to the filing of lawsuits, requests have been made to the Federal Mediation and Conciliation Service to assist in reaching a resolution of the dispute and mediation has been attempted.

Legal Services Corporation - H-2C workers are not eligible for legal assistance under the Legal Services Corporation Act.

Family Members - H-2C workers cannot bring accompanying spouses and minor children unless they are themselves H-2C workers.

Unlawful Immigrant Participation - Agricultural employers may use the H-2C program to employ farmworkers unlawfully present as of the date of introduction, so long as the workers leave the U.S. for a period within six months of becoming H-2C workers. Until the implementation of the H-2C program, such aliens may legally continue to work in agriculture.

Numerical Limitation - The total number of aliens who may newly receive H-2C status each year is limited to 500,000, except that:

- under an automatic escalator, if the yearly allotment is exhausted, the allotment for that and subsequent years shall be increased by up to 10%. If that higher allotment is itself exhausted in a subsequent year, the allotment for that and following years shall be increased by up to 10%, and

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NEWS

State News Briefs

State Funding Plan Would Raid Conservation, Farmland Preservation Funds

A group of state House Republicans have proposed a mix of one-time money transfers and other maneuvers to generate the nearly \$2.5 billion needed to balance the 2017-2018 state budget adopted in July. Pennsylvania Farm Bureau has concerns about plans to pay for general state spending by drawing from funds that have been set aside for farmland preservation and programs that help improve farm conservation practices. The plan calls for one-time transfers of \$27 million from the fund used for farmland preservation and \$76 million from a pair of accounts used to help conservation districts fund special projects and environmental initiatives, including some on farms. The proposal, unveiled by the group of lawmakers this week, has not yet received a vote. The state Senate already passed its version of a revenue plan, which calls for a mix of new or increased taxes - including a natural gas severance tax and higher levies on utility bills - and other funding measures. The \$32 billion spending plan adopted in July authorizes the state to release money for most programs, including the Department of Agriculture's operations, once the revenue is in place. But funding for two other programs important to agriculture - University of Pennsylvania School of Veterinary Medicine and Penn State Cooperative Extension - remains held up because it requires the approval of separate spending bills. Both the Penn State and Penn Vet funding bills were approved by the Senate but have not yet received a vote in the House.

From Farm Bureau Express, Penna. Farm Bureau, September 8, 2017.

The Future of Natural Gas Use on Farms

Pennsylvania's boom in Marcellus Shale hydraulic fracturing — or fracking — has produced a plentiful supply of cheap natural gas throughout rural Pennsylvania. Yet access to this energy source is limited for most farmers.

Although some farms now use low-pressure natural gas for heating, the plentiful supply of cheap, unconventionally produced natural gas provides an opportunity for producers to cut costs. By switching from propane to natural gas, farmers can power irrigation systems, dry crops, heat large buildings and greenhouses, and fuel farm trucks and tractors, said Thomas Murphy, Director of Penn State's Marcellus Center for Outreach and Research.

The cost savings of natural gas can be substantial. However, a lack of pressure regulation equipment and transportation infrastructure limits farmers wishing to capitalize on the surplus of natural gas.

Murphy noted that most gas produced in southwestern and western Pennsylvania is considered wet gas. This gas has a mix of hydrocarbon liquids that require processing before residential or commercial use. The bulk of gas produced in northern and north-central Pennsylvania is dry gas, meaning that it only requires pressure regulation.

Some gas companies may allow farmers with existing well-heads or pipelines on their land to divert some of the dry gas flow onto their farm for heating uses at a modest cost. However, the high-pressure, high volume output from unconventional shale gas wells requires users to implement costly regulators to decrease the pounds per square inch (PSI) of gas to a pressure compatible with on-farm heating and power generation systems.

In lieu of costly pipeline expansion from gas processing

centers and/or regulation stations to rural areas, large businesses and agricultural operations can gain access to natural gas through a "virtual pipeline". This system connects industrial facilities and rural municipalities to the natural gas market through a network of pipeline terminals, heavy trucks, and decompression stations.

Murphy said this system is a great opportunity for Pennsylvania farms and related agricultural businesses. Large businesses or cooperatives that purchase truckloads of compressed natural gas through a "virtual pipeline" may be able to support surrounding farms with a reliable supply of gas, provided they install a local decompression station.

However, until public utilities are retrofitted to provide access to and regulate compressed natural gas throughout rural Pennsylvania, many farmers will forego conversion and continue using their traditional energy sources.

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

Bill Aims to Expand Broadband in Rural Areas

A bill introduced in the state Legislature aims to help rural communities keep pace with urban areas in affordable and reliable phone and broadband service.

Senate Bill 740, sponsored by state Sen. Ryan Aument of Lancaster County, was referred to the Senate Consumer Protection and Professional Licensure Committee for consideration. The measure would extend the life of the state's Universal Service Fund through at least 2021. That fund supports telecommunication services in rural areas, which tend to be the most costly areas to provide service to.

The fund plays an important role in ensuring that phone and broadband service is available and affordable to rural residents. The state may have to rely even more on that fund now to expand service due to decreased support from federal programs.

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

Agriculture Water Quality Inspections Underway

Pennsylvania's farmers are fortunate to have plentiful access to water with the state's extensive network of rivers and tributaries. Lately, however, agricultural producers have found that the bountiful resource comes with a cost.

In 2010, the U.S. Environmental Protection Agency implemented a total maximum daily load (TMDL) limit on the amount of nitrogen, phosphorus and sediment that can be deposited into the Chesapeake Bay. Pennsylvania's Department of Environmental Protection is tasked with enforcing the TMDL and meeting EPA's targets of a 25 percent reduction in nutrient loadings and a 20 percent reduction in sediment loadings by 2025.

Last year, DEP and several county conservation districts began an Agricultural Inspection Initiative to gauge farm-level nutrient and erosion control compliance. Staff from DEP and the conservation districts have reported more than 1,125 visits to farms within the watershed between September 2016 through March 2017 with at least 875 more scheduled for the rest of 2017.

The inspections are intended to ensure compliance with the required implementation of both a written Manure Management Plan (MMP) and an Agricultural Erosion and Sedimentation Plan (Ag E&S Plan), if applicable.

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NEWS

State News Briefs *(continued from page 4)*

As of mid-July, DEP had inspected 264 farms and conservation districts had completed 861 inspections, covering at least 119,000 acres. Of the farms that have been inspected, 81 percent were required to have implemented a MMP and 83 percent of producers were required to have introduced an Ag E&S Plan on their farms.

Of those farms required to have an MMP, DEP reported that 70 percent had a plan written and 64 percent were meeting the baseline requirements. Of those needing an Ag E&S Plan, 68 percent had one written and 59 percent had a plan that met the necessary requirements for erosion control.

DEP's quarterly progress report found that 74 percent of farmers with a written MMP reported they had received some form of assistance with plan development and 61 percent of farmers had help completing an Ag E&S Plan.

For additional information about the Agricultural Inspection Initiative or assistance with nutrient and sediment plan development, please visit: <http://bit.ly/PaDEPVisits>. Farmers can also use PAOneStop, an online tool designed to help farmers meet nutrient loading requirements, at <https://www.paonestop.org>.

Susceptible Soybean Varieties May Be Affected by Herbicide Drift

Crinkled and cupped leaves in soybean fields that are not protected by the Monsanto Xtend technology could possibly be the result of herbicide drift from applications of dicamba or 2,4-D in neighboring fields.

Although Pennsylvania has experienced some of the symptoms of herbicide drift in soybeans, most of the complaints are originating from growers in the Midwest. Soybean growers are generally aware of the risk posed from applications of older, more volatile dicamba formulations in neighboring fields. Soybeans with Xtend technology are resistant to damage from dicamba but are restricted to dicamba applications from new low-drift formulations from BASF, Monsanto and DuPont.

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

Teaching Teachers About Agriculture

The northern Lancaster County elementary school where Tom Larkin teaches is surrounded by farmland. But few of his students come from farming backgrounds or have any direct connection to agriculture.

As Larkin sees it, educators need to fill in that gap and form that connection. There are many career options in agriculture and the farming community will continue to need bright, young minds. But without being exposed to agriculture in school, students won't be likely to consider it as a career.

"The number one industry in Pennsylvania is agriculture," Larkin said. "To not address that is foolish."

That's why he was among the three dozen educators who traveled to State College in July for the Educator's Ag Institute, a five-day crash course for teachers who want to introduce agriculture education to their classrooms. The institute — organized and run each year by the Pennsylvania Friends of Agriculture Foundation, a charitable organization supported by Pennsylvania Farm Bureau — includes classroom sessions as well as tours of farms and agricultural research facilities.

Beth Lechleitner, a teacher from Franklin County, was impressed by how agriculture-focused lessons can help students learn hands on about science. She said she's often surprised that even her agriculture-heavy area, most of her sec-

ond-grade students think their food comes from the grocery store shelf.

"I think bringing agricultural sciences in, even at an elementary level, helps them get a better understanding of how that actually happens," Lechleitner said.

For many of the teachers, the institute was an introduction to agriculture. But that wasn't the case for Shelly Harner, a high school biology and physics teacher from Greene County. She grew up and lives on a farm and was encouraged by members of the Greene County Farm Bureau to attend.

"I know the background knowledge but I'm learning how to use it in the classroom," Harner said. "I have lots of new ideas that I can use in our rural school setting."

Jason Coopey, of Way Fruit Farm in Centre County, was among the farmers to host the teachers. For the agricultural community, he said, the tours are a chance to address misconceptions about farming and help teachers — and then their students — fully understand the issues. He discussed how integrated pest management has evolved over the past few decades to ensure that food safety is a priority.

"I think they have a better grasp of what the real issues are and what the common-sense issues are and hopefully that changes their perspectives and they bring it back to their students," Coopey, a PFB member, said. "It's easy to have buzz words. It's harder to have true knowledge."

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

Injecting Manure Reduces Estrogen Loads, Study Finds

Researchers at Penn State's College of Agricultural Sciences have found that injecting manure into crop fields using shallow disks, rather than spreading it, significantly reduces estrogen in surface runoff.

Applying livestock manure to crop fields provides essential nutrients and adds organic matter to the soil but the practice also introduces water contaminants. Reducing those contaminants in runoff has been a major focus of efforts to improve water quality in the Chesapeake Bay.

The Penn State study suggests that farmers may be able to reduce manure's effect on downstream water quality by changing applications methods. While the equipment required for shallow disk injection can be expensive, the change could bring other benefits, such as reduced odor, and is compatible with no-till planting.

However, researchers are not ready to recommend that farmers start adopting the practice yet. They want to study whether injecting manure could cause it to leech into the groundwater.

"There potentially could be some trade-offs with groundwater quality, so by doing the shallow disk injection you could be promoting more nutrient and estrogen loss into groundwater, perhaps causing localized concerns for people pulling their water from wells," said Heather Gall, assistant professor of agricultural and biological engineering at Penn State. "However, at least from a surface runoff perspective, the results suggest that shallow disk injection could be a viable option for reducing both nutrient and estrogen transport to surface water bodies, such as the Susquehanna River and the Chesapeake Bay."

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



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NEWS

Western Pennsylvania Fall Greenhouse Meeting Nov. 2

You are invited to attend a greenhouse production and marketing meeting for producers and marketers of floriculture crops.

Research-based information on best management practices will be presented in the areas of:

- Floriculture production techniques
- Controlling pests
- Pesticide safety
- Marketing your business via social media.

Pesticide recertification credits for licensed Pennsylvania and West Virginia applicators will be awarded.

Agenda items for this meeting include:

- "Flower Trials Update: Annuals"
- "Understanding Pesticide Toxicity"
- "Overview of Federal Labor Laws for Agricultural Employers"
- "Matching Pesticide to Pest, in Sync with Biocontrols"
- "Flower Trials Update: Perennials"
- "Hot Topics in Greenhouse Pest Control"
- "An IPM Approach to Managing Weeds in the Greenhouse".

This Western PA Fall Greenhouse Meeting will be held on November 2, 2017 from 8:30 a.m. to 3:30 p.m. at Soergel Orchards in Wexford, PA. You can register online at <http://extension.psu.edu/fall-greenhouse-meeting> or by phone at 724-627-3745. The registration fee is \$50. Checks, credit cards, and debit cards are accepted. The walk-in fee is \$60 (cash or check) at the door if space allows.

Please direct any questions about the program to Lee Stivers 724-228-6881 or ljs32@psu.edu.

Alert: The Allium Leafminer is Active!

Timothy Elkner, Shelby Fleischer and Dana Roberts

The Allium Leafminer has emerged the last week of September and we are already seeing feeding damage signs. Protect your crop!

As we roll into the fall season that means it is time again to be on the look out for Allium leafminer adults. We have just received reports this week indicating fly emergence.

Most of the feeding damage we are seeing seems to be focused on green/bunching onions but we have also found adults within leek plantings. We suggest growers immediately start their chosen management method for the fall allium crops.

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Adult female Allium Leafminer creating feeding/oviposition marks.

High Tunnel Production Basics and Bio-Intensive Tomato Production School Planned for December

Penn State Extension is partnering with the Pennsylvania Association of Sustainable Agriculture (PASA) to hold a two-day High Tunnel School in Mercer. Participants can choose to attend either or both days. Pesticide recertification credits will be awarded.

The Production School will be held on December 13th and 14th, 2017 from 8:30 a.m. to 4 p.m. at the Mercer County Extension Office.

The December 13th High Tunnel Production Basics program topics include:

- Site and construction considerations
- Monitoring and managing soils in high tunnels
- Water quality and its impact on plant growth and plant protection
- Managing the growing environment
- Implementing an IPM system in high tunnels
- Marketing strategies and marketing niches
- Food safety.

The December 14th Bio-Intensive Tomato Production program topics include:

- Tomato cultivars for the high tunnel grower
- Tomato production: fertilization, nutrient management, pruning and training, and pollination
- Using biological organisms to manage insects and mites
- Using bio-fungicides and bio-insecticides in high tunnels
- Post-harvest handling of tomatoes.

To register, please visit <http://tinyurl.com/HighTunnelBiointensive> or call 724-627-3745. The registration fee is \$120 per person for both days or \$65 per person for a single day. Checks, credit cards, and debit cards are accepted. The registration deadline is December 8. Walk-ins will be accepted as space allows. Walk-in fees are \$150 for both days or \$70 for a single day payable by check or cash.

Registration cost includes all program materials, snacks, lunch, and a flash drive with all of the presentations and handouts loaded onto it.

Please direct any questions about the program to Lee Stivers 724-228-6881 or ljs32@psu.edu.

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NEWS

Bilingual Workshops Teach Integrated Weed Management

Lee Stivers

Penn State Extension has developed new resources for weed management and is beginning to offer bilingual training opportunities.



Penn State Extension and USDA Natural Resources Conservation Service (NRCS) collaborated to provide bilingual training to English and Spanish speaking farmers and agricultural workers in western Pennsylvania this summer. Thirty people attended two workshops on weed identification and weed scouting; Spanish was the primary language for five participants.

The first workshop was held on July 27th at Harvest Valley Farms in Gibsonia, a fruit and vegetable farm that has hosted meetings of beginning and establishing farmers in the area since 2015. The second workshop was held on August 30th at Johnston's Evergreen Nursery near Erie, and included Hispanic crew workers from this large nursery operation. Penn State Extension Educator Lee Stivers facilitated the hands-on sessions on weed identification and scouting. USDA NRCS Conservationists Gisela Carmentat (at Harvest Valley Farms) and Zenik Crespo (at Johnston's Nursery) presented information about the technical services and cost sharing programs offered by NRCS. Gisela and Zenik also served as translators for Spanish-speaking participants.

At the beginning of each workshop, participants walked through production fields and gathered samples of weeds they found, including ones they recognized and ones they did not. Gathered around picnic tables, and armed with hand lenses, notebooks, and copies of Penn State Extension's *Stubborn Weeds of Pennsylvania* and *Malezas de Pennsylvania* (Spanish version), participants worked together to identify a variety of weeds, including annuals, perennials, grasses, sedges and broadleaf weeds. This hands-on activity sparked lively discussions about how to control weeds in different production systems, and about invasive weeds to watch for, such as Palmer amaranth. To wrap up the session, Lee presented recommendations on how and when to scout for weeds, how to use scouting information as part of an integrated weed management strategy, and general considerations for control of annual, biennial and perennial weeds.

Results of a short post-workshop survey show that participants gained important knowledge about weed identification and management, and that they intend to use this information to improve production and profits at their operations. Twenty-nine surveys were returned.

- 97% indicated that they were interested in developing more sustainable practices for managing weeds.
- 83% indicated that they learned something that had the potential to make their farm/operation more profitable in the future.

Asked about the estimated potential increase in profits per acre as a result of better weed control, seven participants indicated a range of \$25-500/acre.

- 90% intend to use Penn State Extension's weed guide to help them identify weeds.
- 62% intend to adopt new weed scouting practices.
- 66% intend to apply a new weed management practice.

In addition, individual participants commented that they would use the information from the workshop to identify weeds on their operations, time herbicide applications for better control, scout earlier to catch weeds in seedling stages, and involve workers more in weed control plans.

Workshop host Lori Follett, of Johnston's Evergreen Nursery, confided that her workers felt especially appreciated and valued by being included in the workshop. Lori followed up with this message: "Thank you very much for having the weed ID and scouting meeting yesterday. We enjoyed it very much. I received some very positive feedback from [four Hispanic crew workers who attended]. We very much appreciate the translation as well. I hope this is the first of many."

This project was funded by a PDA Specialty Crop Block grant and a NE SARE grant. To obtain a copy of either *Stubborn Weeds of Pennsylvania* or *Malezas de Pennsylvania*, please contact Lee Stivers.



Growers use Penn State Extension's Stubborn Weeds of Pennsylvania to identify weeds at Harvest Valley Farms in Gibsonia. Photo: L. Stivers, Penn State

Ms. Stivers is with Penn State Extension in Washington Co. From Penn State Extension, extension.psu.edu, September 22, 2017.

The Value of Standard Operating Procedures

Lisa McKeag

While the thought of developing standard operating procedures (SOPs) for your farm may seem daunting, or simply like a bureaucratic waste of time, these standardized protocols are simply a way to capture routine farm processes and ensure that they happen the same way each time. SOPs come up a lot when talking about produce safety and complying with the sanitation standards of FSMA's Produce Rule or 3rd-party GAP audits, but their usefulness goes well beyond jumping through food safety hoops. A well-written SOP can help you save time, train workers, manage pests, and put out a more consistent product.

A standard operating procedure doesn't need to be complicated—in fact, it should be as concise as possible. This brief document should provide step-by-step instructions for a specific task. A good rule of thumb is if the same thing needs to be done more than twice, you should have an SOP for it.

Accurately capturing all of the steps to even a simple process does require an investment of time. These steps are often stored only in a farmer's head and might have evolved over a long period of time. You might not realize all of the steps that go into a certain process or the best way to



It's important to have SOPs for tasks that affect both produce safety and quality, like wash and pack procedures. Photo: K. Campbell-Nelson

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GENERAL

The Value of... (continued from page 11)

tell somebody else how to do it. Writing an SOP should start with either doing a job yourself, or watching somebody else do it, and writing down all of the steps that lead to the completion of the task. Note which tools and materials are necessary for the job, and if there are tricks that you use to make the job easier. Involve anyone who routinely performs this task to weigh in on whether you've captured the process accurately and included important details or efficiencies. The SOP should be complete enough so that someone who has not done the task before can pick it up after some initial instruction and do it well with little supervision. Investing this time up front will pay you back in the amount of time you save by not having to spend as much time training—or correcting mistakes.

A general format for an SOP might consist of the following parts:

- Title
- Objective/purpose—what task are you accomplishing and why?
- Scope—where and to whom does it apply?
- Responsibility—who is responsible for making sure the task gets done?
- Materials—what specific items will be needed to complete this task?
- Procedure—what are the steps to the task, in order?
- Verification/documentation—how will you verify that the procedure was completed correctly and which records will you keep?

Some examples can be found in the Resources section at the end of this article.

Each of these sections should be written in short, direct sentences that are easy to understand after a quick read. Use visual instruction as much as possible. Include pictures of, for example, the tools you will need or the way something should look at each step in the process. SOP sheets should be readily accessible and not locked away in an office. Workers should be able to refer to an SOP easily, so it is a good idea to keep it posted—maybe laminated, or in a plastic sheet cover—at eye level in the area where the task will be completed. This way too, the SOP can be easily edited if a part of the process is eliminated or improved, or one of the materials changes. For instance, if you start using a different rate or brand of sanitizer.

SOPs are useful for tasks that are complex or involve many steps that should be done in order, or where amounts must be accurate. They are useful where there is high worker turnover and a frequent need for retraining. If different employees have responsibility for training or supervising, they should be working from the same standard. It is confusing for a trainee to learn Mary's way one day and Jim's the next—the process and standard for completion should be agreed upon ahead of time and adhered to. This makes improvements easier too, since you know what you're doing you also know what you could be doing differently, and you have a formalized way to get everyone on the same page.

SOPs are particularly useful where there is a high risk for mistakes or contamination. This is why they feature so prominently in farm food safety plans. You might have SOPs for labelling product, or how to organize boxes in the cooler. Having confidence that produce leaving the packhouse is labeled correctly and is headed to the right place can help with traceback in the event of a recall. You generally can't see contamination. You can see a disorganized wash room or manure caked onto

tractor tires, and these things are good indications that the risk for nearby produce to become contaminated is high, but you can't easily see the pathogens that actually make produce unsafe. When devising SOPs for organizing the wash room or cleaning the tractor, you should consider the hazards that your produce may encounter on its way out the door and include steps that help you feel confident that you have done all you can do to manage those risks. For instance, in devising a wash room protocol, you should include steps for eliminating standing water, cleaning and sanitizing food contact surfaces, and keeping totes and tools off the floor and protected from pests. Even though you can't see that the area is free from pathogens, with a good SOP you have the peace of mind that you have thought through the likely routes of contamination and addressed them, you have a checklist of instructions that everyone can see, and employees are trained on all of the instructions. This goes not just for human pathogens, but also plant pathogens and weeds. You could have an SOP for sanitizing equipment that has been used in fields that are infected with *Phytophthora*. The University of Idaho has SOPs for all of the field procedures at their research farm to prevent the spread of a particularly noxious weed.

Other examples of tasks that may warrant a written SOP:

- Leafy greens washing, drying and packing
- Tote washing and sanitizing
- Monitoring and changing sanitizers in wash water
- Moving animals
- Water sampling
- Greenhouse seeding
- Mixing and applying pesticides
- Sprayer calibration
- Monitoring irrigation equipment
- Any task that you want done efficiently and consistently

Resources

The Cornell GAPs program has several good examples of SOPs relevant to the major food safety risk areas: <https://gaps.cornell.edu/educational-materials/decision-trees/log-sheets-sops>. Make sure to tailor these to your own farm so they accurately reflect your actual processes.

North Carolina Extension Produce Safety. Standard Operating Procedures <https://ncfreshproducesafety.ces.ncsu.edu/ncfreshproducesafety-gaps-standard-operating-procedures/>

Penn State Extension. Standard Operating Procedures: A Writing Guide <https://extension.psu.edu/standard-operating-procedures-a-writing-guide>

University of California Extension. Standard Operating Procedures http://ucanr.edu/sites/placernevadasmall-farms/Farm_Business_Planning/FBP_Risk_Management/Risk_Management/SOP/ by

*Ms. McKeag is with the Univ. of Mass. Vegetable Program. From the **Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass. Extension, Vol. 29, No. 22, September 14, 2017.***

Why are Twospotted Spider Mites Such Problems Lately?

Gerald Brust

This has been an odd season, like most of them I guess, with lots of rain when we normally have drought and cool temperatures when we normally have heat. We have had problems this year with striped cucumber beetles, hornworms, leafhoppers, squash bugs and, surprisingly, with twospotted spider mites, *Tetranychus urticae* (TSSM). Normally we expect to see heightened problems with this mite come mid-July through August because it is hot and dry and the mite thrives in this environment. But this year we have had much cooler temperatures with heavy rains — all the things that should greatly reduce TSSM populations. But when visiting watermelon or tomato or cucumber, eggplant, you name it fields I have still found spider mites. In some fields the mites are in numbers causing yield reducing injury (Fig. 1). This is astounding with the environmental conditions we have had. In other fields the mites are in moderate to low densities, but ready to surge given the opportunity.

TSSMs have been suppressed it seems with miticide sprays but have not been reduced enough that they still aren't causing some problems. Some growers blame the miticide, but the miticides being used are effective, they just don't seem to be very effective. There are a few possibilities that may be reducing the effectiveness of the miticides. One possibility is in many fields growers are adding the miticide to their regular spray program for other pests. The regular program includes pyrethroids. Pyrethroids have a wide-spectrum of insect control and are useful when there may be several pests to be controlled such as several worm species, stink bugs, squash bugs, cucumber bee-

flies, etc. But it is not good to put them into a regular weekly spray program as they can exacerbate TSSM, thrips and aphid populations. Save the pyrethroids for when you do face several pests at the same time and use them then. If you really need to have a weekly insecticide spray program try at least to rotate the mode of action (MOA) of the insecticide that is used. Growers who rotate or use insecticides sparingly or use organic insecticides seem to have far fewer problems with TSSMs than growers who use weekly sprays of pyrethroids.

The other possibility is that TSSMs are really a complex of species that are extremely variable in their biology, but are called one species known as the twospotted spider mite. Much controversy exists as to the taxonomic placement of TSSMs, as there are approximately 65 synonyms included under this one species. So it should not be too surprising that we see from time to time outbreaks of this 'species' when we would not expect it. Whether there is a shift in the 'type' of TSSM we have in our area or not would be difficult to tell for sure. There are other possible explanations as to why TSSMs are becoming such problems: poor spray coverage, not enough spray pressure or gallonage used, putting the miticide out too late, etc. But these types of problems have always been with us and it has been in just the last 4-5 years that the TSSM has become an increasingly large problem in our vegetable fields that needs to be examined. This is something I hope to do over the next few seasons.

(continued on page 14)

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VEGETABLE PRODUCTION

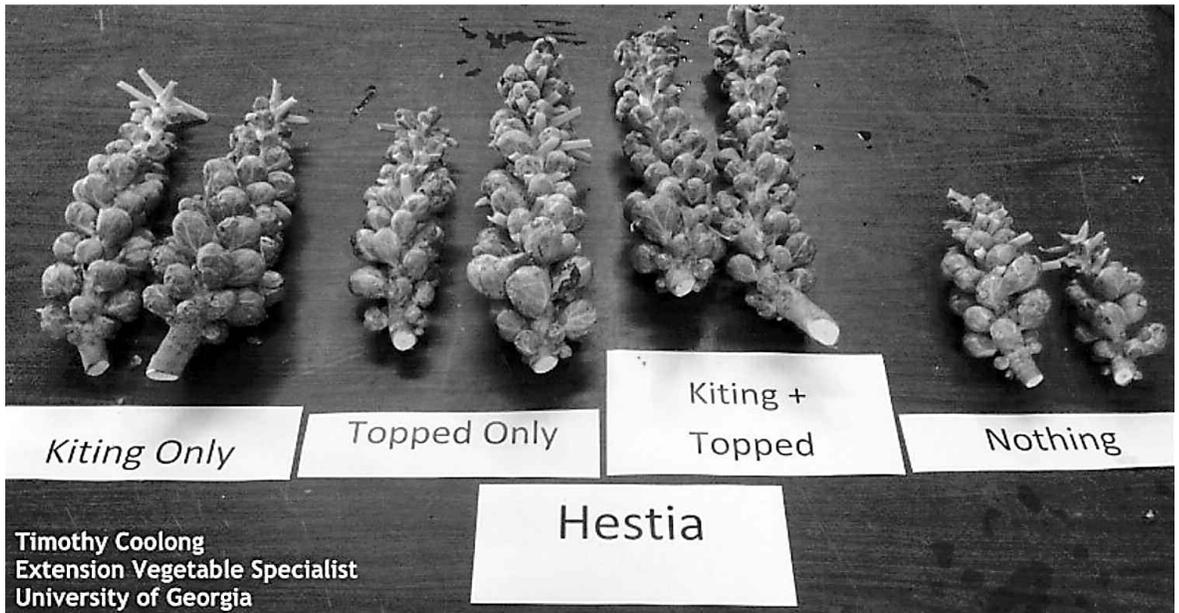
Managing Brussels Sprouts for Fall Harvest

Gordon Johnson

Brussels sprouts have gained popularity as a vegetable with consumers and growers on Delmarva have started producing the crop again for local sales. Larger acreages of Brussels sprouts were grown in the past on Delmarva and the area is well adapted for the crop in the fall.

Topping and lower leaf removal (kiting) will increase uniformity and yields in Brussels sprouts. Cut off the terminal (top) of plants when sprouts begin to form in mid-September. It will then take about 30 days for sprouts to fully develop. At the same time, remove the bottom leaves progressively as the sprouts develop to produce firmer sprouts.

Sprouts can be harvested from mid-October onward. Snap or cut sprouts from the stem successively from the bottom. Commonly, flavor is improved after a frost (sprouts are less bitter). Brussels sprouts will tolerate heavy frosts but will freeze once temperatures drop below 20°F.



Plants of the 'Hestia' Brussels sprout variety topped and/or with lower leaves removed (kiting) had much higher yields than untreated plants.

Whole stalk harvest (once over) is also practiced. Cut the whole stalk when the majority of sprouts are at least 1.5 inches in diameter and remove any leaves.

Dr. Johnson is Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 25, Issue 25, September 15, 2017.

Why are Twospotted... (continued from page 13)



Figure 1. Twospotted spider mite feeding in tomato. Moderate to low damage.



Yield reducing feeding.

Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 25, Issue 23, September 1, 2017.

Calcium Disorders Revisited

Gordon Johnson

Calcium dominates exchange sites in soils and is rarely deficient. However, a number of calcium disorders can affect crops, even in well limed soils including:

- Blossom end rot in tomatoes, peppers, and eggplants
- Blossom end rot in watermelons
- Watercore and glassiness in melons
- Internal leaf tipburn in cabbage
- Leaf tipburn and curd defects in cauliflower
- Internal browning of Brussels sprouts
- Leaf tipburn in spinach
- Leaf tipburn in lettuce
- Leaf tipburn and deformity in strawberry
- Internal browning, hollowheart, storage disorders, and poor skin set in potatoes
- Cavity spot in carrots
- Bitter pit, cork spot, cracking, internal brownspot, and water core in apples
- Hypocotyl necrosis in beans and other legumes
- Meristem death or distortion of new growth from meristems in many plants (cupped leaves)

Calcium is taken up in quantity from the soil by the plants from the undifferentiated area right behind the root tip. Once in the root, it moves in the xylem (water conducting vessels) and is distributed in the plant. Much of this movement in the xylem occurs by exchange. Calcium is attracted to the xylem wall and must be displaced by another ion (another calcium or other cation). This process is driven by transpiration and subsequent water movement through the xylem. Therefore, calcium movement is relatively slow compared to other nutrients that move easily in the transpiration flow. Calcium is not translocated in the phloem (plant food transport system) so it cannot move from one area of the plant to another.

Calcium has many roles in the plant from root growth control, to cell membrane function, to stomatal regulation. The main function that leads to the disorders listed above is in the formation of plant structure. Calcium is component of cell walls and the middle lamella which cements plant cells together. Calcium provides cross linkages in the pectin-polysaccharide matrix and adds to the structural strength of plant tissues. When insufficient calcium is present, plant tissues do not form properly and they may appear deformed and in severe cases may become necrotic – tissues may die or collapse.

Because calcium moves slowly through exchange in the xylem and is dependent upon water flow, disruptions in that flow can lead to localized deficiencies in calcium. Plant organs with low transpiration rates or that are rapidly expanding such as fruits and storage roots often do not receive enough calcium to support that growth. Growing tips and meristematic areas that are rapidly laying down new cells are also at risk for calcium deficiencies when water flow is interrupted. High humidity, drought, flooding (leading to roots shutting down), root injury, compaction, and root diseases can therefore lead to calcium disorders by the reduction of water flow and calcium exchange and movement in the xylem.

Competition from other cations such as magnesium (Mg^{2+}), ammonium (NH_4^+), and potassium (K^+) can also affect calcium (Ca^{2+}) uptake and movement. In low pH soils, aluminum can interfere with calcium uptake and lead to deficiencies.

(continued on page 16)

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Fall Soil Testing

Katie Campbell-Nelson with Lisa McKeag

Although soil samples can be taken any time, many prefer to take samples in the fall because this allows time to apply any needed lime to adjust pH, plant a cover crop to recover any left-over nutrients, make a nutrient management plan, and order materials well in advance of spring planting. It is best to take soil samples at the same time of year for the most consistent and reliable results. Avoid sampling when the soil is very wet or soon after a lime or fertilizer application. If a field is uniform, a single composite sample is sufficient. A composite sample consists of 10 to 20 sub-samples taken from around the field and mixed together. To obtain sub-samples, use a spade to take thin slices of soil representing the top 6" to 8" of soil. Make sure to remove any thatch or other organic debris such as manure from the surface before taking your sample as this will inaccurately impact your soil organic matter results. A soil probe is faster and more convenient to use than a spade. Put the slices or cores into a clean container and thoroughly mix. Take about one cup of the mixture, dry it at room temperature spread out on paper, put it in your own zip lock bag, and tightly seal it. Label each sample on the outside of the bag or box. On the submission form to the lab for each sample, indicate the crop to be grown, recent field history and any concerns.

In many cases, fields are not uniform. There are many reasons for this including: uneven topography, wet and dry areas, different soil types and areas with varying previous crop and fertilizing practices. For example: "There was a tractor mishap in this field years ago and a ton of lime was dumped right here." In

Calcium Disorders... (continued from page 15)

Control of calcium disorders starts with proper liming. This provides soil calcium and raises the pH to eliminate the effect of aluminum. The most important factors to control calcium disorders are to supply a steady rate of water (through a good irrigation program), limit root damage (such as root pruning by cultivation), provide a rooting area for plant that is free from compaction and waterlogging, and create a healthy soil environment that limits root disease potential. Above ground, planting at spacing that allows for good air movement around the plant will also help. Control fertilizer programs to limit competition between calcium and other ions (use nitrate forms of nitrogen instead of ammonium forms for example). In addition, choose varieties that are less susceptible to these calcium disorders (varieties with very large or very long fruit are more susceptible to calcium deficiencies).

There have been mixed results with foliar application of calcium and these applications should be considered a supplement to help limit these disorders and not a correction for calcium deficiencies and good soil and water management. As stated before, calcium movement is limited so it will be difficult to get calcium to where it is needed by foliar sprays except when applied to active meristematic tissue. Calcium sprays have been effective in improving quality in crops such as apples. Sidedressed calcium has been shown to have positive effects on root crops such as potatoes, particularly in sandy soils. Calcium nitrate applied through the drip irrigation system can help alleviate calcium disorders in some drip irrigated vegetables such as tomatoes.

Dr. Johnson is Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the Weekly Crop Update, Univ. of Delaware Extension, Vol. 25, Issue 22, August 25, 2017.

such cases, the field should be subdivided and composite samples tested for each section or avoid problem areas entirely.

Soils should be tested for organic matter content every two or three years. Be sure to request this as it is not usually part of the standard test.

Submitting Soil Samples:

Depending on your goals, different tests are appropriate. In addition to standard soil tests, other services are often available including: Pre-Sidedress Soil Nitrate Test (PSNT), manure or compost analysis, soilless greenhouse media, soil texture, and plant tissue analysis.

A fall nitrate test or "report card nitrate test" as some university labs call it, indicates how closely crop nitrogen (N) uptake has been matched with nitrogen supply for the season. High (> 20 ppm) or excessive soil nitrate content in the fall indicates that too much N fertilizer was applied in the prior season, and a fall cover crop would be beneficial to conserve this remaining N for the following season.

A standard soil test that includes other macro- and micronutrients can help you make the best choice to fit a particular crop to a given soil nutrient profile for the following season. When submitting your soil sample for testing, include the crop code on the form for the crop to be grown in that field the following year if that option is available.

Interpreting Results and choosing amendments.

Soil pH: Most New England soils are naturally acidic (4.5-5.5) and need to be limed periodically to keep the pH in the range of 6.0 to 7.0 desired by most vegetable crops and beneficial microbes. The lab report will recommend the amount of lime to apply based on active and exchangeable acidity as well as the crop(s) to be grown. Active acidity is a measure of the H⁺ ions in solution while exchangeable acidity is a measure of H⁺ ions adsorbed on soil humus and clay colloids. Soils with a higher cation exchange capacity (CEC) have a greater potential for higher exchangeable acidity. Therefore, more lime will be needed to raise the pH in a high CEC organic matter soil than in a low CEC sandy soil with the same amount of active acidity. Lime can be applied any time, but fall is preferred to allow several months to raise the pH. Split applications (half in the fall and half in the spring) may also be effective.

Compost is often applied as a method for increasing soil organic matter. However, do not overlook the fact that composts contain nutrients which are soluble and available for crop use just like commercial fertilizers. While only about 10% of total N analysis in compost is available to the crop each year, 80-100% of P analysis in compost has been shown to be available, increasing the potential for losses to the environment if not applied to actively growing crops. Phosphorous content also varies in compost from 0.1-3%, so analysis is important for determining rates of application. Sheet composting is not a recommended practice on bare fields in the fall unless a cover crop is planted. A compost analysis should be completed to measure nutrient availability and to determine if the product is finished before applying to the field. Unfinished compost applied to the field may harbor pathogens or harm crops as it continues to decompose. Ammonium content <100mg/kg and C:N ratio of 20:1 indicates a finished compost. Higher amounts of ammonia indicate active decomposition, or unfinished compost, and the C:N ratio is reduced as microbes break down carbon content in

(continued on page 17)

Managing Boron for Cole Crops

Gordon Johnson

The micronutrient boron is critical for production of cole crops (broccoli, cabbage, cauliflower, Brussels sprouts, kale, collards). Boron is naturally deficient in our sandy soils, and is also subject to leaching with rainfall, so available soil boron declines over time.

Cole crops have a moderate to high boron requirement. Symptoms of boron deficiency vary with crop type. Most boron deficient cole crops develop cracked and corky stems, petioles and midribs. The stems of broccoli, cabbage and cauliflower can be hollow and are sometimes discolored. Cauliflower curds become brown and leaves may roll and curl, while cabbage heads may be small and yellow. Of all the cole crops, cauliflower is the most sensitive to boron deficiencies.

It is recommended in broccoli and kale to apply 1.5-3 pounds of boron (B) per acre in mixed fertilizer prior to planting. In Brussels sprouts, cabbage, collards and cauliflower, boron and molybdenum are recommended. Apply 1.5-3 pounds of boron (B) per acre and 0.2 pound molybdenum (Mo) applied as 0.5 pound sodium molybdate per acre with broadcast fertilizer.

Boron may also be applied as a foliar treatment to cole crops if soil applications were not made. The recommended rate is 0.2-0.3 lb/acre of actual boron (1.0 to 1.5 lbs of Solubor 20.5%) in sufficient water (30 or more gallons) for coverage. Apply foliar boron prior to heading of cole crops.

Other fall crops such as beets, radishes, and turnips are also susceptible to boron deficiencies in sandy soils with limited boron fertilizer additions.

Fall Soil Testing...

(continued from page 16)

the pile and convert it to CO₂. Matured compost applications are usually made in the spring, however, testing may happen in the fall in order to estimate plant available nutrients for next year's crop and help determine future compost application rates.

Manure is an excellent source of nutrients, however, as manure ages and decays, considerable nutrient loss occurs from leaching, surface runoff, or volatilization of ammonia into the atmosphere. Manure may also contain pathogens such as *E. coli* and *salmonella*. If manure is used, vegetables should not be harvested before 120 days after application (or 90 days for vegetables that do not contact the soil, such as peppers). This is a requirement for organic production and a good practice for everyone. In most cases, manure should be applied in the fall or to a non-food rotation crop. Fall-applied manure should be incorporated immediately and a winter cover crop should be planted to protect N from leaching.

(continued on page 27)



Gerald Holmes
California Polytechnic State University at San Luis Obispo
Bugwood.org 1574139

Boron deficiency in broccoli.

Dr. Johnson is Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the *Weekly Crop Update*, Univ. of Delaware Extension, Vol. 25, Issue 24, September 8, 2017.

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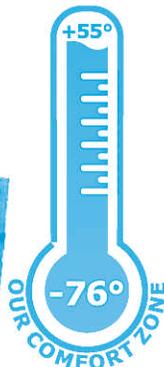
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VEGETABLE PRODUCTION

Fall Diseases of Brassicas

Susan Scheufele

Fall, with its cooler temperatures and dewy mornings, is the time when diseases of brassicas can quickly take off and reduce yield and quality. There are a few major diseases of brassicas which share much in common—they all can be seed-borne, they all can survive in crop residues in soil for about two years, they are spread by wind and splashing water and insects like flea beetles, and are favored by moist conditions. This means that the following preventive, cultural practices will go a long way in reducing the impacts of all of the diseases described in this article.

- **Start with disease free seedlings.** All of these diseases are commonly introduced on infested seed. Either talk to your supplier to be sure the seed has been tested or, better yet, hot water treat your seed to eradicate bacteria, fungi, and oomycetes that may be present (you can do this at home with some simple equipment, or contact your Penn State Extension Educator for assistance in heat treating your seed. Avoid overwatering and encourage air flow through greenhouses. Monitor transplants in the greenhouse and remove any symptomatic plants.
- **Plant into a clean field.** That means rotate out of brassicas (including weeds like shepherd's purse, wild radish, field pennycress, etc.) for 2 to 4 years. Any amount of rotation you can do will help and the further the better, as these diseases can be dispersed by wind and insect feeding. Chopping and burying infested residue quickly after harvest will shorten the period of time the organisms persist in the soil. For example, avoid leaving diseased Brussels sprouts stalks standing in the field through the winter; mowing them is better than nothing if you can't disk them in. Manage cull piles well so that they do not become sources of inoculum.
- **Reduce leaf wetness.** All of these diseases require moisture to grow and spread. Increase plant spacing so plants will dry off more quickly and so the pathogens can't as easily spread from plant to plant. If overhead irrigation is necessary, or when watering in the greenhouse, water on a sunny day when leaves will dry quickly.



Brussels sprouts stripped of lower leaves to improve airflow around plants and reduce leaf wetness.

- **Control insects and remove weeds.** Flea beetles can move fungal spores and bacteria from plant to plant and field to field. A study showed that spores of *Alternaria*

brassicicola occur on their bodies, in their mouths, and in their feces, and that flea beetles actually concentrate *Alternaria* spores in their mouthparts when they clean their antennae. The insects move from plant to plant, basically injecting spores and bacteria into wounds they create through their feeding. Therefore, reducing flea beetle pressure will also reduce the spread of diseases through the field. Similarly, cruciferous weeds can harbor diseases and act as bridges between fields and between seasons. Weeds also crowd the crop, increasing moisture and leaf wetness in the row making the environment around the plant more conducive to disease.

Chemical control. There are many effective pesticides to control these diseases; please see the [Mid-Atlantic Commercial Vegetable Production Recommendations] for chemical recommendations. Copper products and plant defense activators like Actigard or Regalia are the best choices for managing black rot. Avoid using excessive pressure when spraying for black rot as this can very efficiently spread the bacteria throughout the planting and can cause abrasions and wounds through which the bacteria can enter the plant—use only enough pressure to get good coverage. OMRI approved fungicides have not shown good efficacy for other diseases but many copper products, plant defense activators like Regalia, and other biopesticides are labeled for downy mildew, black rot, and alternaria—check labels.



Black rot on cabbage.

Black Rot is one of the most devastating diseases of brassica crops, and can result in high losses of yield and quality. The bacterium, *Xanthomonas campestris* pv. *campestris*, plugs the water-conducting tissue of the plant with xanthan, a mucilaginous sugar causing chlorosis (yellowing) and wilt.

Seedlings are commonly affected but symptoms can appear at any growth stage or an infected plant may appear symptomless. The most common and characteristic symptom is a yellow, V-shaped lesion that extends from the leaf margin toward the base of the leaf, caused by bacteria entering through guttation droplets that form at the hydathodes. Lesions can also occur mid-leaf, as darkened dead patches of tissue between the veins, where wounding from insect feeding, hail, or mechanical injury has occurred. The pathogen may move into the plant vasculature; infected veins turn black as they are plugged with xanthan, and the normal flow of water and nutrients is impeded. Blackened veins may also appear in root crops like rutabagas even though foliar symptoms may not be present. On heading crops, infection may spread into the leaves of the head and is often followed by invasion by soft-rotting organisms.

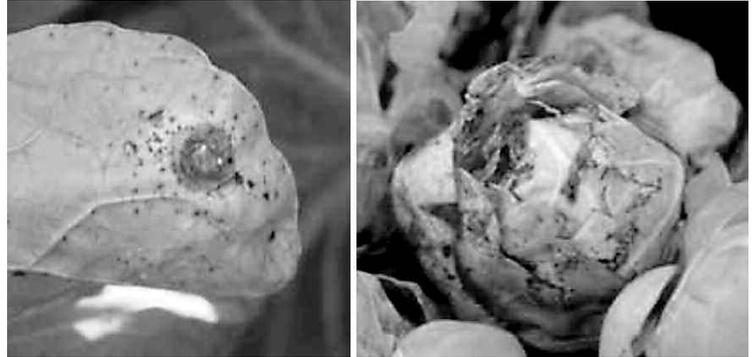
Black rot is commonly transmitted by seed, and a seed lot with as little as 0.03% infected seed can cause an epidemic. (continued on page 19)

VEGETABLE PRODUCTION

Fall Diseases... (continued from page 18)

The bacteria can persist in infected plant debris for up to two years, but can only survive for 40 to 60 days in the soil in the absence of host tissue. Disease development is favored by warm, wet weather and is spread within the field by splashing water, wind, equipment, workers, and by insects such as through flea beetle feeding. *X. campestris pv. campestris* can be spread long distances or introduced into new areas by infested seeds and transplants.

Alternaria leaf spot is a fungal disease that affects all cultivated brassicas, causing small black spots that grow into large lesions with characteristic concentric rings on leaves, stems and heads. The disease can be caused by several fungi in the genus *Alternaria*, but the most damaging species in the production of vegetable brassicas are *A. brassicae* and *A. brassicicola*. Disease development is favored by cool temperatures and long periods of leaf wetness or high relative humidity, and *Alternaria* leaf spot can be a limiting factor in the production of vegetable and seed crops in regions where these conditions are common. Infection can cause reduction in crop quality and yield through damage to seeds, seedlings, leaves, and heads, and can also spread during storage of vegetable crops like cabbage. Brussels sprouts can be rendered unmarketable by numerous small spots on the buds. Brown, sunken spots on heads of broccoli and cauliflower can make those crops unmarketable. The disease can spread in storage so management is especially important for cabbage and other storage crops and crops should be inspected for early symptoms before storing. In New England, as cultivation of a wide range of brassica crops and a longer growing season through season extension has increased



Alternaria leaf spots on Brussels sprout leaf (left) and sprout (right)

in recent years, this disease has become more severe and is causing more losses, especially in fall crops.

The initial symptoms of *Alternaria* leaf spot are small black dots surrounded by chlorotic haloes. As the disease progresses lesions expand into characteristic, dark brown to black circular leaf spots with target-like concentric rings. The centers of lesions often turn brown and crack or fall out, giving the leaf spots a shot-hole appearance. Individual spots coalesce into large necrotic areas and leaf drop can occur. Lesions can occur on petioles, stems, flowers, flower pedicels, and seed pods. Pod infection causes distortion, premature shattering, and shriveled, diseased seed that germinate poorly.

Alternaria species overwinter primarily in diseased crop debris. Lignin-rich stalk tissues can persist in the soil for over two years, and the fungi can remain active on that tissue as long as it is present. Disease development is favored by tempera-

(continued on page 20)

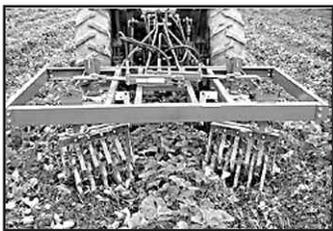
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VEGETABLE PRODUCTION

Fall Diseases... (continued from page 19)

tures of 60-78° F and 12 hours of relative humidity of 90% or more. The main means of introduction into new areas is on infested seed. However, spread from one infected crop into nearby crops occurs easily once the disease is established on a farm. The fungi sporulate profusely and are spread throughout fields by wind, splashing water, equipment, and workers.

In 2009, a Brussels sprout variety trial was conducted by the UMass Vegetable IPM Program. Seven varieties were evaluated—Vancouver, Franklin, Nautica, Diablo, Dimitri, Roodnerf and Oliver. Among these varieties, Oliver and Franklin showed significantly more disease damage from *Alternaria* leaf spot than the other cultivars. There are many fungicides with efficacy against *Alternaria* leaf spot including Quadris, Endura, and Bravo among others—please see the [Mid-Atlantic Commercial Vegetable Production Recommendations] for recommendations. Research on the efficacy of biological fungicides (eg. Serenade, Sonata, and Actinovate, etc.) to control *Alternaria* in cabbage is ongoing at the UMass Research Farm, look for those results over the winter.



Brassica downy mildew on broccoli leaf.

Downy mildew caused by the fungus *Hyaloperonospora parasitica*, is an important disease of broccoli, collards, kale, cabbage, cauliflower and Brussels sprouts, as well as root crops such as rutabaga, turnip and radish. There are many downy mildews, seemingly every crop has one, but they are all unique and very host specific—if you have cucurbit downy mildew you don't need to worry about it infecting your brassicas, or the other way around. Disease development is favored by cool, moist conditions caused by rain, heavy dew, or fog. Infection can occur at any stage of growth. On seedlings, slightly yellow patches appear before whole leaves and cotyledons turn yellow and drop. Early infections can also be symptomless until seedlings are transplanted to the field and conditions become favorable. Irregular, angular yellow to brown spots develop on both the top and bottom of the leaf and a characteristic grayish-white, fluffy growth on the undersides of leaves appears. In the floral parts of broccoli or cauliflower, dark brown areas develop internally in curds or floral buds of the head. Stems and stalks of the flower head may be darkened or have black streaks, and this may be the first sign of infection in broccoli. In cabbage, internal darkening and purplish spots appear in the inner layers of the head or move upward in the head from stem infections. The disease can spread in storage and infected plants are susceptible to secondary infection with soft rot bacteria, resulting in a stinky puddle of rotten cabbage.

Unlike other downy mildews that blow in from afar each year, *Hyaloperonospora parasitica* can survive from season to season as thick-walled resting spores, called oospores, in the soil or crop debris. These sexual spores can survive in the soil for extended periods and produce infectious sporangia when

conditions are moist and cool, especially at night. Other sources of initial inoculum are infested seeds, or cruciferous weed hosts. Disease development is favored by abundant moisture on leaves provided by dew, drizzling rain, or heavy fog, and by temperatures of 50 to 60°F. Sporulation, germination, and reinfection can occur in four to five days. Sporangia (secondary, asexual spores) are spread throughout the field by wind, splashing rain, and by feeding insects. This disease commonly infects plants early on but shows no symptoms until environmental conditions become favorable and suddenly all the plants begin to show symptoms later in the season. Resistant or tolerant varieties of broccoli have been developed; our sources list Marathon and Arcadia among these.



Phoma on cabbage leaf. Photo, C. O'camb from pinwhandbook.org.

Blackleg (*Phoma lingam*) causes a leaf spot and a stem canker on many cruciferous crops, especially cauliflower, broccoli, and turnip. Rutabaga, radish, and mustard cultivars are only slightly susceptible. This disease can spread rapidly within a field. Initial symptoms are small lesions on stems at cotyledon stage which elongate, turn brown with a black to purplish border, and become sunken. The lesion extends up and down the stem, the stem becomes girdled and blackened, with many fruiting bodies (pycnidia) embedded in the tissue. Lesions may extend below the soil and attack roots. Diseased plants often wilt, lodge, and die. On root crops, symptoms occur in the form of cankers on the fleshy roots and a dry rot may appear in storage.

Phoma lingam is a fungus which can survive for up to four years in seed and three years in infected crop debris. Plants can become infected at the seedling stage or at any stage in the field. The initial source is probably infected seed. The disease spreads by spores which are exuded from pycnidia in long coils and are splashed to nearby plants to initiate new infections. The disease is favored by wet conditions, though it may get an early start on seedlings in the greenhouse and cause problems even in dry, sandy fields. The disease has become less important in brassica crops because of successful disease management strategies in seed production. Once present on the farm, management should focus on avoiding spread of the disease by roguing out affected plants and reducing soil moisture.

Ms. Scheufele is with the Univ. of Massachusetts Vegetable Program. From the Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass., Vol. 29, No. 21, August 31, 2017.

Celery Leaf Curl

Bess Dicklow

We are seeing Celery Leaf Curl caused by *Colletotrichum acutatum* in fields now and have seen it every year since it was first diagnosed in 2013. The disease was detected in Michigan and Pennsylvania in 2010 and has also been reported in Connecticut, New Jersey, New York, Virginia, Canada and Australia. *C. acutatum* has a broad host range infecting pepper, tomato, bean, spinach, strawberry, apple, peach, blueberry, lupine, zinnia, cowpea, safflower, numerous weeds and more. It is not known if strains of the fungus infecting different hosts can infect celery and vice versa. The pathogen is most important on



Celery leaf curl. Photo, MSU Extension

strawberry, and may become more important on pepper in Massachusetts because it infects even green pepper fruit and is very aggressive unlike the more common anthracnose pathogen, *C. coccodes*.

Symptoms on celery include curled leaves, occasional discoloration of leaf margins, twisted petioles, and lesions on petioles. Leaves remain green but often appear fan-like and curl downward. Leaf curl is often the most prominent symp-

tom observed and can resemble injury from growth regulator type (i.e. 2,4-D) herbicides. Infected plants are stunted with small, malformed, cupped leaves which become brittle and crack. The fungus advances into the stalks which become twisted with reddish to light brown lesions developing on the outside and inside of the stalks or inside the crown. Advanced symp-



Petiole twisting and lesions from celery leaf curl. Photo, MSU Extension.

(continued on page 23)

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VEGETABLE PRODUCTION

Contaminants in Processed and Fresh Market Vegetable Crops

Gordon Johnson

Contaminants are a major concern for vegetable processors and packers. Consequently, quality control/food safety programs have been developed by vegetable companies to reduce the risk of tainted products.

One major concern in processed vegetables is foreign materials such as glass, metal, plastic, and stones. A high risk area for foreign material in processing vegetable fields is next to roadsides where bottles, cans and other litter is often found.

Managing to reduce foreign material contamination requires inspecting fields prior to harvest and hand removal of these materials. In processing plants, magnets can be used to remove metals; gravity and flotation based systems can remove heavier materials such as glass and stones, color sorters also can remove some of these materials, and having crews hand remove contaminants over a grading belt is another option.

Insect contaminants are a second area of concern. In particular, those insects that “bore” into or lay eggs inside of fruits, seeds, leaf whorls, or stems, and cannot be removed in washing and sorting operations, are problematic. A major issue is consumers finding “worms” in processed vegetable products or fresh produce. Snap beans, edamame vegetable soybean, pickles, sweet corn, and spinach are examples of crops where there is a zero or low tolerance for insects in harvested products for processing.

Managing to reduce or eliminate insect contamination starts with strict control programs in the growing field. Insect damaged fruits and seeds may be removed by hand or by mechanical means during grading. However, insects found in fruit or seed interiors may be difficult to remove by these methods.

Weed seeds and fruits are a third area of concern, especially for processors. The most problematic are those weeds that produce a seed or fruit similar in size and color to the harvested product. A good example is horsenettle. It produces a fruit similar in size and shape to lima bean seeds which end up being harvested along with the lima beans in field operations.



Horsenettle fruits are a lima bean processing crop contaminant because they are a similar color and shape as baby limas.

Managing to reduce or eliminate weed contamination of vegetable products starts with good weed control in the field. If a field has a history with a problem weed then efforts should be made to eliminate that weed in rotational crops. If there are small areas of escaped weed contaminants in a field then they

can be removed by hand. Post-emergence applications of herbicides timed properly can reduce flowering and weed seed and fruit formation in some cases. Avoiding harvest in infested areas is another practice to reduce contamination by weeds.

Contamination from disease causing organisms is another area of concern in processed vegetables and fresh packed produce. Infected produce may be discolored, may have off-tastes, or may generate bad odors. Infected produce may also break down or rot in transit. One major problem in recent years has been *Phytophthora capsici* causing breakdown of watermelons and cantaloupes during shipping. It is a major concern in pickles causing breakdown of pickle fruits between washing operations and delivery to the processing plant. In lima beans, harvest of *Phytophthora* infected pods has

tainted whole runs of lima beans during processing with foul odors rendering a significant number of frozen lots unsaleable.

It also can taint products such as frozen lima beans with a foul odor reducing salability.



G Johnson

Phytophthora capsici infected watermelon fruit can cause “melting” in the bin during staging and transit.

Control programs should be targeted on problem diseases to reduce contamination. In particular, fields with a history of *Phytophthora capsici* should be avoided if possible. Chemical control programs should be used as a preventative when suspect fields are planted to susceptible vegetables such as lima beans, cucumbers, or watermelons. Because this is a soil-borne organism with a long-term resting spore that infects during wet periods, all efforts should be made to improve drainage in fields. Avoid harvest in field areas with infections.

Processors and packers are also concerned with off-label applications of pesticides, and therefore keep detailed records of herbicide, insecticide, fungicide, and other chemical usage. One major issue has been days to harvest with herbicide applications. Quick growing vegetables may be ready for harvest ahead of the label restrictions. Rotational restrictions with herbicides also limit field options for many vegetables.

Lastly, microbial contamination with food-borne illness causing organisms such as *E. coli* and *Salmonella* is a major concern in high risk vegetables that are consumed fresh such as lettuce and other leafy greens, tomatoes, and netted muskmelons. All produce growers should have a food safety plan and implement practices to reduce potential contamination with food borne human pathogens.

Dr. Johnson is Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the Weekly Crop Update, Univ. of Delaware Extension, Vol. 25, Issue 26, September 22, 2017.

VEGETABLE PRODUCTION

Celery Leaf... (continued from page 21)

toms of collapsed and rotting centers may easily be confused with Black heart, a physiological condition of celery related to poor calcium assimilation and fluctuating water levels. Celery may become infected at any stage of growth in both the greenhouse and field, and plants become disfigured and unmarketable.

Life Cycle: *C. acutatum* is known to overwinter in the soil, in association with plant debris, or in infected weeds in several plant families. The fungus can remain for long periods in dead plant material on the surface or buried in the soil. It can penetrate through all plant parts, but the crown is often preferred due to the relatively humid conditions there. Conidia (spores) are easily spread in splashing water from overhead irrigation and wind driven rain leading to rapidly developing infections.. The pathogen grows best at warm temperatures (> 77°F), but can be active from 59° to 86° F. Leaf wetness duration of greater than 12 hours results in the most severe disease although infection can occur with shorter leaf wetness periods.

Management: *C. acutatum* can be carried from the greenhouse into the field and symptoms may be latent at first, causing outbreaks later on. Start with clean flats and growth medium. Scout plants twice a week for symptoms; remove and destroy affected plants. In the greenhouse, provide good ventilation with horizontal fans, heating and venting, especially when warm days are followed by cool nights. Use irrigation practices that promote rapid drying and make sure water does not pool anywhere in the greenhouse. In the field, removal of crop debris after harvest and plowing under crop residue will limit pathogen carryover from year to year. A 3-4 year crop rotation with non-

host plants should be followed. Avoid working the fields when the plants are wet, work in fields with a history of the disease last, and power wash equipment between fields. Celery seed continues to be screened for this pathogen at Penn State, however it has not been found to be seed borne yet. A similar pathogen of celery, *C. nymphaeae*, causing celery stunt anthracnose has been detected in seed by researchers in Japan, and seed treatment at 122°F for 30 minutes has been recommended.

Several research trials have shown that the strobilurin fungicides are most effective (i.e. Quadris or Flint). Resistance to these fungicides develops fairly quickly so they should be rotated with other fungicide classes such as propiconazole (Tilt) and should be mixed with a protectant fungicide (e.g. chlorothalonil, mancozeb, or copper). Consult the Mid-Atlantic Commercial Vegetable Production Recommendations for further details.

Dr. Dicklow is with the Univ. of Massachusetts Plant Disease Diagnostic Lab, Emeritus. From the Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass. Extension, Vol 29, No. 23, September 28, 2017.



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VEGETABLE PRODUCTION

Troubleshooting Pole Lima Beans

Emmalea Ernest and Gordon Johnson

Pole lima beans are a very profitable crop for market gardeners and produce growers across Delaware and also have an enthusiastic following among home gardeners. However, a number of problems can come up that limit yield potential. We have getting calls about three major issues in recent weeks.

Downy Mildew

Downy mildew, caused by *Phytophthora phaseoli*, affects pods, shoot tips, racemes (flower stalks) and sometimes petioles, but there are rarely symptoms on leaves. Downy mildew produces a white cottony growth on affected plant parts. This season's wet weather has favored Downy mildew's development and spread.

Some other lima pathogens can also produce white mycelial growth on pods (white mold, pod rot, *Pythium*) but these rarely affect trellised pole beans because their spread depends upon proximity to infested soil.

Phosphonate fungicides containing potassium phosphite salts (i.e. Phostrol, Agri-Fos) are effective if applied when downy mildew symptoms are first observed. Some of these products are available in smaller quantities (quart) that are suitable for use by growers with small farms or home gardeners. Ridomil Gold is an option for commercial applicators. As a cultural control, growers may consider removing symptomatic pods from the field in addition to spraying. Plant debris should be removed at the end of the season to prevent overwintering of downy mildew, especially if limas are grown in the same area year after year. If you save your own seed, do not save seed from diseased pods.



Downy mildew on a pod of Dr. Martin pole lima bean.

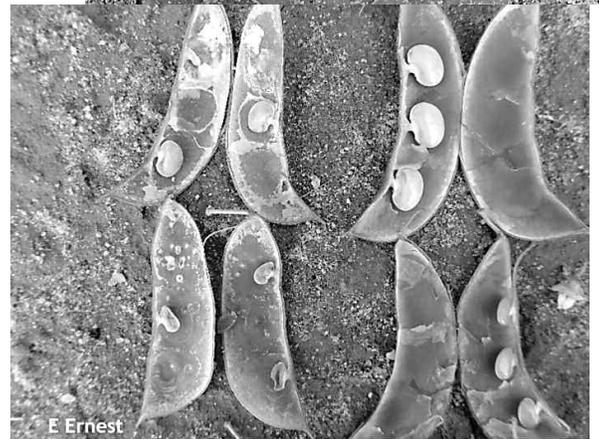
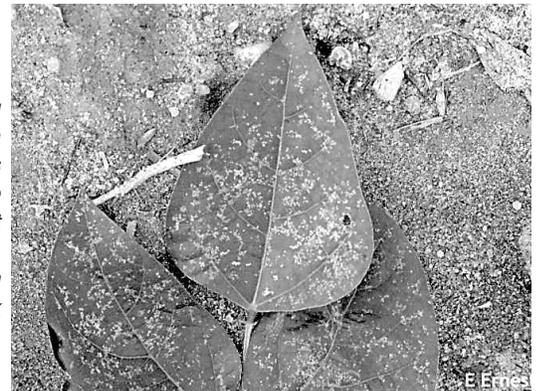


Downy mildew on shoot tip, petiole and leaf of Dr. Martin pole lima bean.

Stink Bugs

Three of our common stink bug species are pests of lima bean: green stink bug, brown stink bug, and brown marmorated stink bug. Stink bugs can reduce lima bean yields significantly. These insects feed by piercing developing pods with their needle-like stylets, sucking sap out of the pods or young seeds. This causes misshapen seeds in more developed pods and dropped pods when seeds inside young pods are killed. Hot weather will also cause poor pod set, but if conditions are cool and pods and flowers are dropping from plants, stinkbugs are

Stinkbug feeding damage on a lima bean leaf. This type of damage probably does not cause yield loss, but it will help you to know that stink bugs are present.



Stink bug feeding damage on baby lima pods (left) and undamaged pods at a similar developmental stage. Stink bug feeding can kill developing seed and cause fluffy white growth inside of pods at the feeding site.



Pole lima bean pod with stink bug feeding damage indicated by arrows.



Stink bug eggs on a pole lima pod.

(continued on page 26)

Spotted Wing Drosophila Update

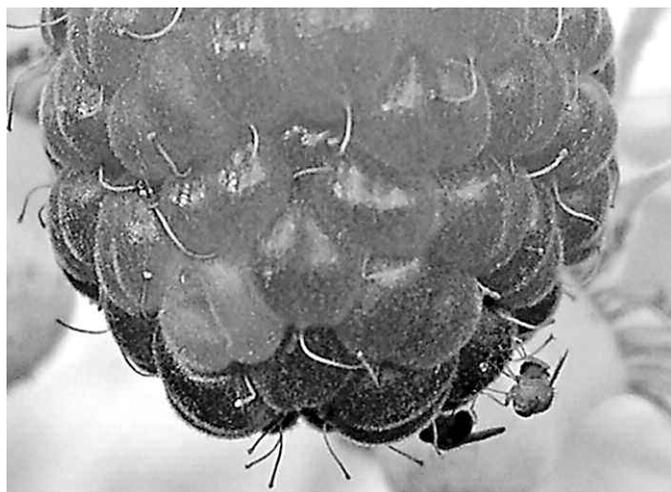
Kathleen Demchak

Clouds of spotted wing drosophila are still around our raspberries, and it's apparent this pest is going to be a challenge every year for the foreseeable future.

I always intend to write an article over the winter that summarizes good sources of info on SWD management, but it always seems that there are different issues to write about then. Now, as I'm hoping for some cold temperatures to slow down SWD population growth, I figured I'd put together a few thoughts and sources of info to mull over. Maybe as the evenings get longer and harvest winds down, you'll have a chance to check these out.

First, related to the psychology and mindset behind dealing with SWD, which is the first step in confronting SWD management, an article by Mark Longstroth at MSU, which was written this past June, just lays it all on the line: Plan to change when dealing with spotted wing Drosophila.

If you need help with identification, I still like the photos in the Penn State article, Spotted Wing Drosophila, Part 1: Overview and Identification. It looks like the new online version posted has some photos added that belong to others, in addition to the ones we originally included, so my thanks to the folks who provided those.



Raspberry with injured drupelet and spotted wing drosophila. Photo: K. Demchak, Penn State

There's a nearly hour-long video "Making the Most of Your Insecticide Toolbox to Manage SWD" which brings together personnel from number of institutions under the USDA-NIFA-SCRI project "Sustainable Spotted Wing Drosophila Management". It covers topics such as efficacy of products, use of spreader-stickers, rainfastness, and other topics to help with management when using insecticides. This video will be useful as you inventory what insecticides you have left over from this year, and consider what you might want to order for next year.

For those who wish to avoid insecticide applications completely, Dale Ila Riggs describes how she had managed to exclude spotted wing drosophila completely from her blueberries in a short video. Perhaps netting is in your future.

Though it may be too late to get ahead of SWD this year, we may as well start getting prepared for next year. When thinking about ordering plants and supplies over the fall and winter, it also makes sense to think about avoidance of SWD by growing early-season varieties that are largely harvested by mid-July—before SWD numbers soar, and budgeting to get the supplies in place that will give the most control for the dollar otherwise.

Ms. Demchak is with the Department of Plant Science at Penn State Univ. From Penn State Extension, extension.psu.edu, September 13, 2017.

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VEGETABLE PRODUCTION

Troubleshooting Pole... (continued from page 24)



Recently hatched stink bug nymphs on a pole lima pod.

E Ernest



Adult brown stink bug.

E Ernest

Green stink bug nymph



E Ernest

frequently the cause of the problem. Scouting for stinkbugs in a mass of thick pole be foliage can be difficult. You may want to instead look for the damage they cause to confirm they are causing a problem.

Insecticide sprays are used for control. Commercial applicators may consult the Mid-Atlantic Commercial Vegetable Recommendations for insecticide options (<http://extension.udel.edu/ag/vegetable-fruit-resources/commercial-vegetable-production-recommendations/>). Home gardeners and small scale growers can look for products containing bifenthrin which are labeled for use on lima beans. Follow the product directions for application and days until harvest. Such products are available in some garden centers. Be careful with some of the pyrethroids because they can cause mite populations to explode by reducing natural controls (predators).



Brown marmorated stink bug nymph.

E Ernest

Leaf Yellowing

The third issue we have seen is yellowing of leaves and poor vine growth not related to insects or disease. This is often due to nitrogen deficiencies in mid-summer. In addition, in a wet year such as 2017, poor root function and denitrification resulting from saturated soils will lead to poor vine growth, yellowing, and poor pod set. Severe N deficiency in lima beans will be seen as an overall yellowing of plants with lower leaves often dropping off as N is mobilized from the oldest leaves to support the new growth at growing tips. Less severe N deficiency will be seen as a lighter green color than normal with lowest leaves most affected. There are other potential causes for yellowing in lima beans including low pH leading to magnesium deficiencies and excessively high pH leading to micronutrient deficiencies, most commonly manganese.

*Ms. Ernest is Associate Scientist in Vegetable Crops and Dr. Johnson is Extension Vegetable and Fruit Specialist, both at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Extension, Vol. 25, Issue 26, September 22, 2017.*

Adult green stink bug.



E Ernest



Grown in PA. It makes a difference.

Fall Soil Testing... (continued from page 17)

Manure applications should be made in cold weather to reduce volatilization, but not to frozen ground as this increases surface runoff potential. In no-till systems, research has shown that manure can be effectively surface applied to a growing cover crop to reduce nutrient losses, but not to bare ground. In order to make accurate nutrient applications to best fit your crop needs, a manure analysis should be conducted.

Cover crops planted in the fall, preferably before September 15th, are an excellent way to capture and store nutrients for your crops in the following spring. While your soil test results will not recommend cover crop selection, here are some general guidelines for fall-planted cover crops and their spring contributions of plant available nitrogen (PAN) per acre:

Legume cover crops provide up to 100 lb PAN/a. To maximize PAN contribution from legumes, kill the cover crop at bud stage in the spring.

Cereal cover crops immobilize up to 50 lb PAN/a. To minimize PAN immobilization from cereals, kill the cover crop during the early stem elongation (jointing) growth stage.

Legume/cereal cover crop mixtures provide a wide range of PAN contributions, depending on legume content. When cover crop dry matter is 75 percent from cereals + 25 percent from legumes, PAN is usually near zero.

Micronutrient application recommendations can be found in the Mid-Atlantic Commercial Vegetable Production Recommendations.

Other Nutrient applications should be avoided until spring when a growing crop is best able to use the applied nutrients in water soluble form and avoid leaching, runoff, or volatilization.

Ms. Campbell-Nelson and Ms. McKeag are with the Univ. of Massachusetts Extension. Originally written by Ms. Campbell-Nelson in 2015 and updated by Ms. McKeag in 2107. Adapted for Pennsylvania from the Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass. Extension, Vol. 29, No. 22, September 14, 2017.

NEWS

Ag Guestworker... (continued from page 3)

- under an automatic de-escalator, if the yearly allotment is not exhausted, the allotment for subsequent years shall be decreased by up to 5% (or a percentage representing the unutilized portion of the original allotment). If that lower allotment is itself not exhausted in a subsequent year, the allotment for following years shall be further decreased by up to 5% (or a percentage representing the unutilized portion of the original allotment) – except that the allotment for any year can never fall below 500,000.

To the extent that agricultural employers use the H-2C program to hire:

- farmworkers unlawfully present as of the date of introduction, or
- workers they had previously employed under the H-2A or H-2B programs,

such workers will not be counted against the numerical cap.

Federal Public Benefits - As non-qualified aliens, H-2C workers are ineligible for most Federal public benefits. In addition, they will be ineligible for Obamacare subsidies and refundable tax credits (the Earned Income Tax Credit and the Child Tax Credit).

Green Cards - The 10,000 immigrant visas available each year for unskilled workers will be reallocated to farmworkers.

Equipment

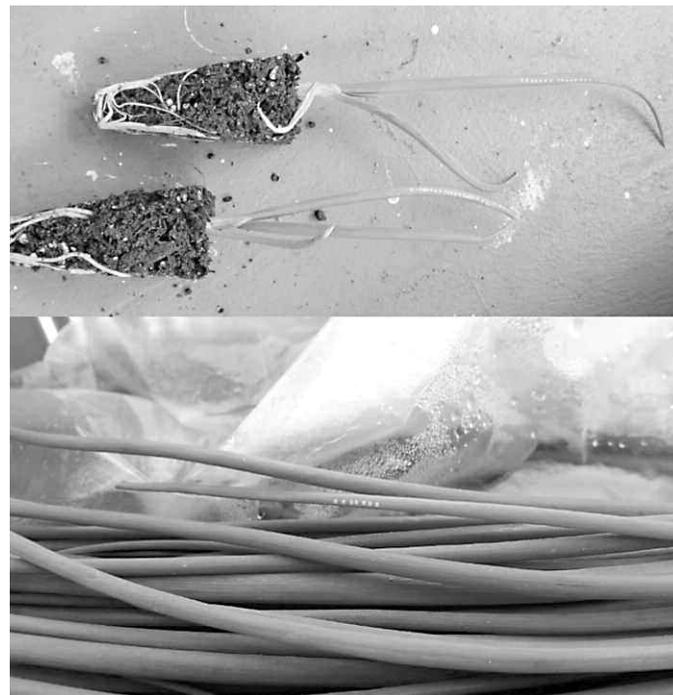
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NEWS

Alert: The Allium... (continued from page 8)

Allium leafminer feeding damage on onion transplants (top) and green onions (bottom).

More information can be found on the Penn State Allium Leafminer Pest Alert page [<http://ento.psu.edu/extension/vegetables/pest-alert-allium-leafminer>] and at the Pennsylvania Department of Agriculture Allium Leafminer page [<http://www.agriculture.pa.gov/protect/plantindustry/pages/allium-leafminer.aspx>].

Dr. Elkner is with Penn State Extension in Lancaster Co. and Dr. Fleischer and Ms. Roberts are with the Department of Entomology at Penn State Univ. From Penn State Extension, extension.psu.edu, September 25, 2017.

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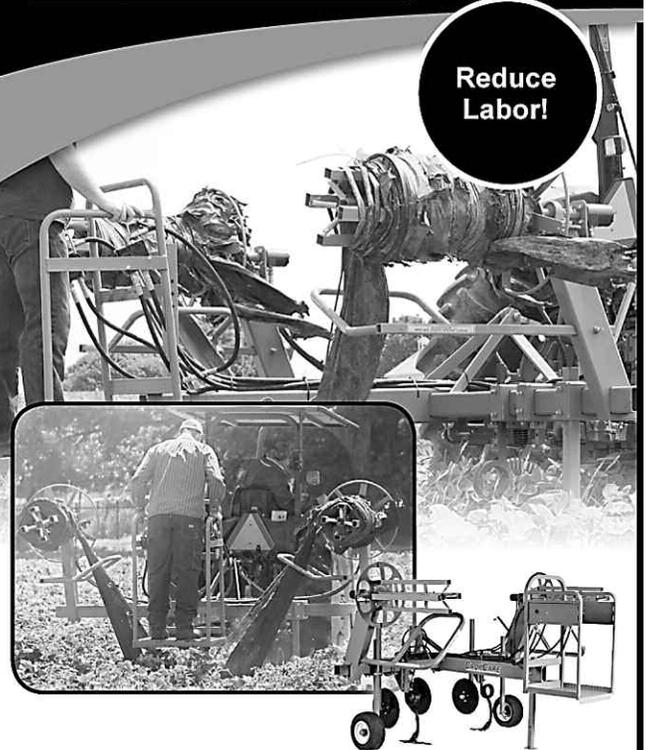
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