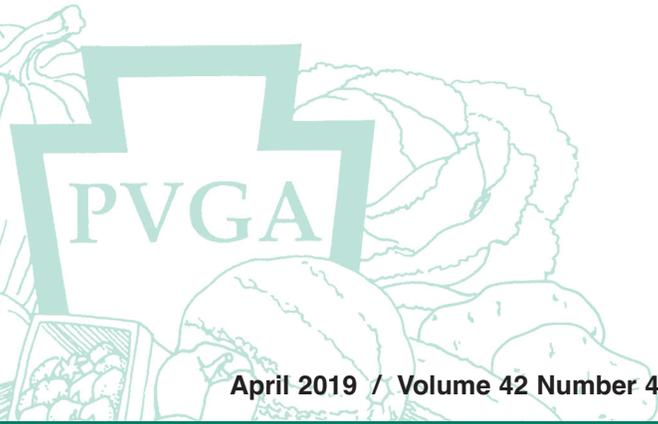


# NEWS



for the commercial vegetable, potato and berry grower

## PA Vegetable Acreage Decreases But Number of Farms Increases

The National Agricultural Statistics service has just released the results of the 2017 Ag Census. It shows that while the number of vegetable farms in Pennsylvania has increased since the last Ag Census in 2012, the number of acres of vegetables grown decreased by 1,300 acres. While some may dispute the accuracy of the Ag Census figures, they are the best statistics we have available for the acreage of the various vegetable and small fruit crops grown in Pennsylvania. Ultimately the accuracy of the Census figures depends on farmers providing accurate responses on the Ag Census forms sent to all farmers.

As in previous Censuses, over half of the vegetable farms in Pennsylvania (65%) produce less than five acres of vegetables. Another 27% produce 5 to 25 acres of vegetables and only 9% grow more 25 acres. The 366 farms who grow 25 acres or more produce 66% of the total acreage. The 2,720 farmers who grow less 5 acres account for 4,153 acres of produce grown or about 9% of the total.

The Census indicates Pennsylvania produced about \$187,319,000 worth of vegetables and \$1,629,000 worth of berries. The Census also indicates 689 growers use 4,115,550 square feet of greenhouse space to produce \$21.5 million worth of vegetables and 37 growers have 79,501 square feet of greenhouses to produce \$148,000 worth of berries and fruits.

	2017		2012	
	Farms	Acres	Farms	Acres
Vegetables harvested for sale	4,218	48,063	3,968	49,397
0.1 to 0.9 acres	955	410	619	279
1.0 to 4.9 acres	1,765	3,743	1,753	3,806
5.0 to 14.9 acres	864	7,270	1,008	7,980
15.0 to 24.9 acres	268	5,079	235	4,410
25.0 to 49.9 acres	189	6,548	178	5,855
50.0 to 99.9 acres	95	6,071	81	5,443
100.0 to 249.9 acres	57	8,080	69	11,046
250.0 to 499.9 acres	19	6,265	19	6,458
500.0 to 749.9 acres	3	1,746	4	(D)
750.0 to 999.9 acres	1	(D)	2	(D)
1,000.0 acres or more	2	(D)	-	

Berries		
Crops	Farms	Acres
Strawberries	822	963
Blueberries	778	876
Raspberries	565	330
Blackberries	215	126

Vegetables		
Crops	Farms	Acres
Sweet Corn	1,672	11,514
Potatoes	1,107	7,643
Snap Beans	965	6,877
Pumpkins	1,305	6,871
Tomatoes	1,586	3,297
Other Vegetables	355+	1,327
Cabbage	564	1,205
Bell Peppers	1,097	1,122
Cantaloupes	597	978
Broccoli	522	947
Winter Squash	602	868
Watermelons	622	774
Cucumbers	791	619
Summer Squash	706	610
Onions (Dry)	559	347
Lettuce	508	327
Cauliflower	334	312
Peppers (Other than Bell)	608	287
Asparagus	403	250
Beets	538	230
Onions (Green)	333	192
Sweet Potatoes	259	151
Eggplant	449	150
Kale	333	130
Carrots	316	128
Garlic	416	126
Celery	79	89
Chinese Cabbage	188	78
Herbs	266	77
Green Peas	222	75
Turnips	190	68
Spinach	278	66
Brussels Sprouts	159	63
Radishes	218	44
Collards	102	39
Rhubarb	197	39
Lima Beans	109	35
Sugar Peas	162	33
Honeydew	38	32
Mustard Greens	94	21
Parsley	130	21

## NEWS



**Pennsylvania  
Vegetable Growers  
Association**

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

President

**Jonathan Strite '22**

Harrisburg

First Vice President

**Brian Campbell '21**

Berwick

Second Vice President

**Rita Resick '20**

Somerset

Secretary-Treasurer

**William Reynolds '22**

Waynesboro

Past President

**David Miller '20**

York

Directors

**Robert Amsterdam '21**

Mechanicsburg

**Peter Flynn '21**

West Chester

**Tina Forry '22**

Palmyra

**Christopher Harner '20**

State College

**Barron Hetherington '22**

Ringtown

**Alan Kemmerer '22**

Berwick

**Arthur King '21**

Valencia

**Kenneth Martin '20**

New Berlin

**Amy Metrick '21**

Butler

**Michael Orzolek '21**

State College

**Christopher Powell '20**

Strasburg

**John Shenk '20**

Lititz

**Robert Shenot '22**

Wexford

**Jeffrey Stoltzfus '20**

Atglen

**Mark Troyer '21**

Waterford

**Executive Secretary**

**William Troxell**

Richfield

## USDA Launches New Farmers.gov Features to Help with H2A Applications, Managing Loans

Agriculture Secretary Sonny Perdue announced today that the U.S. Department of Agriculture (USDA) launched two new features on farmers.gov to help customers manage their farm loans and navigate the application process for H2A visas.

"Customer service is our top priority at USDA and these new features will help our customers as they manage their farm loans and navigate the H-2A temporary agricultural visa program," said Secretary Perdue. "In my travels across the country, I have consistently heard people express a desire for greater use of technology in the way we deliver programs at USDA. As we adopt new technology, we are introducing simple yet innovative approaches to support our farmers, ranchers, producers, and foresters as they support the nation every day. It's my goal to make USDA the most effective, most efficient, most customer-focused department in the entire federal government, and farmers.gov is a big step in that direction."

In 2018, Secretary Perdue unveiled farmers.gov, a dynamic, mobile-friendly public website combined with an authenticated portal where customers will be able to apply for programs, process transactions and manage accounts.

### Navigating the H-2A Visa Process:

Focused on education and smaller owner-operators, this farmers.gov H-2A Phase I release includes an H-2A Visa Program page at <https://farmers.gov/manage/h2a> and interactive checklist tool at <https://farmers.gov/h2a-checklist> with application requirements, fees, forms, and a timeline built around a farmer's hiring needs.

You may view the video at this following link: <youtu.be/E-TXREaZhnl>

The H-2A Visa Program – also known as the temporary agricultural workers program – helps American farmers fill employment gaps by hiring workers from other countries. The U.S. Department of Labor, U.S. Citizenship and Immigration Services, U.S. Department of State, and state workforce agencies each manage parts of the H-2A Visa Program independently, with separate websites and complex business applications.

Over the next several months, USDA will collaborate further with the U.S. Department of Labor on farmers.gov H-2A Phase II – a streamlined H-2A Visa Program application form, regulations, and digital application process that moves producers seamlessly from farmers.gov website to farmers.gov portal to U.S. Department of Labor's IT systems.

### Managing Farm Loans Online:

The self-service website now enables agricultural producers to login to view loan information, history and payments.

Customers can access the "My Financial Information" feature by desktop computer, tablet or phone. They can now view:

- loan information;
- interest payments for the current calendar year (including year-to-date interest paid for the past five years);
- loan advance and payment history;
- paid-in-full and restructured loans; and
- account alerts giving borrowers important notifications regarding their loans.

To access their information, producers will need a USDA eAuth account to login into farmers.gov. After obtaining an eAuth account, producers should visit [farmers.gov](https://farmers.gov) and sign into the site's authenticated portal via the "Sign In / Sign Up" link at the top right of the website.

Currently, only producers doing business as individuals can view information. Entities, such as an LLC or Trust, or producers doing business on behalf of another customer cannot access the portal at this time, but access is being planned.

Google Chrome, Mozilla Firefox or Microsoft Edge are the recommended browsers to access the feature.

---

*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](mailto:pvga@pvga.org) website - [www.pvga.org](http://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.*

# Deer Season to Open on Saturday, Antlerless Allocations Increased

For the first time in more than 50 years, Pennsylvania's firearms deer season will open on a day other than the Monday after Thanksgiving. In voting at their April 9<sup>th</sup> meeting to adopt seasons and bag limits for the 2019-20 license year, the Pennsylvania Board of Game Commissioners established a firearms deer season to begin Saturday, Nov. 30. They also increased the number of antlerless licenses by 65,000 statewide.

Moving the opening day to Saturday will create an expanded, 13-day season that includes three Saturdays.

In recent months, the Game Commission received and reviewed a plethora of public comment on the issue, and hunters' opinions clearly were split. Many of those supporting the move to a Saturday opener said they are unable to hunt on a Monday opener because they are unable to take off work or school to do so. Many of those who supported sticking with a Monday opener cited logistical concerns with traveling to their hunting camps during the Thanksgiving weekend.

The commissioners also were split on the issue.

Commissioner James Daley, who represents the Game Commission's District 1, made an amendment to retain the opening day as the Monday after Thanksgiving, Dec. 2. And Commissioners Tim Layton, District 4, and Michael Mitrick, District 6, voted with Daley in support of the Monday opener.

The rest of the board voted for the Saturday opener, with the 5-3 tally carrying the vote. And the final list of 2019-20 seasons and bag limits that included a Saturday opener was approved by 7-1 margin, with Daley voting against.

Commissioner Brian Hoover, who represents District 8, and who voted for the Saturday opener, said that the level of support or opposition to move varied from one part of the state to the next. Hoover said, in his region, there was little opposition to the move, and Commissioner Stanley Knick Jr., said the same of Region 7.

Hoover said he also feels a Saturday opener in which more hunters can participate is good for hunter recruitment, which is a big part of why it was proposed in the first place.

"We need to look to the future concerning our hunters and bringing in more youth," Hoover said.

The commissioners said the Game Commission in the coming year will track the response to a Saturday opener through license sales, deer harvest and comments about the change.

The board voted to allocate 903,000 antlerless deer licenses statewide, which is up from the 838,000 licenses allocated for 2018-19. Allocations by Wildlife Management Unit (WMU) are as follows, with the allocation from the previous license year appearing in parentheses:

<b>WMU 1A – 49,000</b> (48,000)	<b>WMU 1B – 35,000</b> (37,000)
<b>WMU 2A – 46,000</b> (49,000)	<b>WMU 2B – 54,000</b> (58,000)
<b>WMU 2C – 52,000</b> (44,000)	<b>WMU 2D – 66,000</b> (63,000)
<b>WMU 2E – 32,000</b> (27,000)	<b>WMU 2F – 31,000</b> (23,000)
<b>WMU 2G – 26,000</b> (30,000)	<b>WMU 2H – 6,000</b> (6,000)
<b>WMU 3A – 20,000</b> (22,000)	<b>WMU 3B – 38,000</b> (29,000)
<b>WMU 3C – 46,000</b> (38,000)	<b>WMU 3D – 25,000</b> (25,000)
<b>WMU 4A – 41,000</b> (38,000)	<b>WMU 4B – 32,000</b> (26,000)
<b>WMU 4C – 36,000</b> (30,000)	<b>WMU 4D – 46,000</b> (34,000)
<b>WMU 4E – 34,000</b> (32,000)	<b>WMU 5A – 22,000</b> (23,000)
<b>WMU 5B – 67,000</b> (58,000)	<b>WMU 5C – 70,000</b> (70,000)
<b>WMU 5D – 29,000</b> (28,000).	

Hunting licenses for 2019-20 go on sale in mid-June and become effective July 1. After hunters purchase a general hunting license, they may apply for antlerless deer licenses based on staggered timelines.

The Commissioners approved a split, six-day antlered deer season (Nov. 30-Dec. 6) and seven-day concurrent season (Dec. 7-14) in 20 Wildlife Management Units. The list includes WMUs 1A, 1B, 2A, 2C, 2D, 2E, 2F, 2G, 2H, 3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D, 4E, 5A and 5B. The package also retains the full-season (Nov. 30-Dec. 14) concurrent, antlered and antlerless deer season in WMUs 2B, 5C and 5D.

Hunters with Deer Management Assistance Program (DMAP) antlerless deer permits may use the permits on the lands for which they were issued during any established deer season, and would continue to be allowed to harvest antlerless deer from Nov. 30-Dec. 6 in 1A, 1B, 2A, 2C, 2D, 2E, 2F, 2G, 2H, 3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D, 4E, 5A and 5B. Fees for DMAP permits are \$10.90 for residents and \$35.90 for nonresidents.

DMAP permits also may be transferred to Mentored Hunting Program participants.

The board retained the antler restrictions that have been in place for adult and senior license holders since the 2011-12 seasons. It remains the "three-up" on one side, not counting a brow tine, provision for the western Wildlife Management Units of 1A, 1B, 2A, 2B and 2D, and three points on one side in all other WMUs. Those exempt from these antler restrictions are mentored youth hunters, junior license holders, disabled hunters with a permit to use a vehicle as a blind and resident active-duty military on leave.

Once again this year, the commissioners gave approval to concurrent hunting of antlered and antlerless deer in WMUs 2B, 5C and 5D during most seasons, with the first segment of the archery season to run from Sept. 21 to Nov. 29 in those WMUs.

The Commissioners also reaffirmed the agency's commitment to battling Chronic Wasting Disease (CWD) in Pennsylvania.

The disease, which always is fatal to the deer and elk it affects, has been found in Pennsylvania in captive and free-ranging deer, but the disease has not been detected in most Pennsylvania counties.

On the board's behalf, Tim Layton, the president of the Pennsylvania Board of Game Commissioners, read into the meeting minutes the following statement:

"The Game Commission is 100-percent committed to putting into place measures to manage CWD. We have heard from the hunters and legislators in the Blair and Bedford counties over their opposition to our efforts to control CWD in that region. We took a step back to re-evaluate a better path forward.

"We continue to work with local hunters, communities and legislators to evaluate new strategies to manage CWD.

"Later this month, Game Commission scientists are meeting with numerous colleagues from CWD-affected states to evaluate new strategies to help us manage CWD. We will be working with hunters, communities, and legislators to get their feedback on these new measures when they are developed.

"The Game Commission will not succeed in the battle against CWD alone. If we are going to be successful, we will need the support of hunters, communities and the Legislature. Future generations of deer hunters are depending on us all."

## NEWS

## National News Briefs

### Farm Groups Urge Congress to Reject Proposed Agriculture Cuts

A coalition of agricultural organizations is urging Congress to protect funding for important farm programs, warning that cuts would “deliver a significant blow to U.S. agriculture at a time when farmers, ranchers, and rural America are already struggling.”

President Donald Trump’s 2020 budget proposal calls for cutting \$3.6 billion in U.S. Department of Agriculture funding, a 15 percent reduction. The plan would cut \$1.6 billion from farm bill programs over 10 years by imposing an income cap on crop insurance, reducing average crop insurance premium discounts for farmers, reducing subsidies to crop insurance companies, and eliminating several farm bill programs. It would also eliminate the Rural Energy for America and Rural Economic Development programs and establish user fees for Food Safety and Inspection Service, Animal and Plant Health Inspection Service, Grain Inspection, Packers and Stockyards Administration, and Agricultural Marketing Service.

In a letter to leaders on the House and Senate Budget and Appropriations committees, Farm Bureau and other organizations noted that spending on agriculture programs has already been reduced through the 2014 and 2018 farm bills but that farmers cannot withstand further cuts as they grapple with a struggling farm economy.

“There is no doubt that farm country and the economies of agricultural-based rural America are hurting,” the groups wrote. “With the agriculture and rural economy struggling and as USDA begins implementation of the 2018 Farm Bill, we respectfully request you reject cuts to vital farm policy programs.”

*From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April 2019.*

### EPA Affirms Safety of Glyphosate

The U.S. Environmental Protection Agency (EPA) continues to find that there are no risks to public health when glyphosate is used in accordance with its current label and that glyphosate is not a carcinogen. The agency’s scientific findings on human health risk are consistent with the conclusions of science reviews by many other countries and other federal agencies. While the agency did not identify public health risks in the 2017 human health risk assessment, the 2017 ecological assessment did identify ecological risks. To address these risks, EPA is proposing management measures to help farmers target pesticide sprays on the intended pest, protect pollinators, and reduce the problem of weeds becoming resistant to glyphosate.

“EPA has found no risks to public health from the current registered uses of glyphosate,” said \*EPA Administrator Andrew Wheeler\*. “Today’s proposed action includes new management measures that will help farmers use glyphosate in the most effective and efficient way possible, including pollinator protections. We look forward to input from farmers and other stakeholders to ensure that the draft management measures are workable, realistic, and effective.” “If we are going to feed 10 billion people by 2050, we are going to need all the tools at our disposal, which includes the use the glyphosate,” \*U.S. Secretary of Agriculture Sonny Perdue\* said. “USDA applauds EPA’s proposed registration decision as it is science-based and consistent with the findings of other regulatory authorities that glyphosate does not pose a carcinogenic hazard to humans.” Glyphosate is the most widely used herbicide in U.S. agriculture

and has been studied for decades. Glyphosate is used on more than 100 food crops, including glyphosate-resistant corn, soybean, cotton, canola and sugar beet. Non-agricultural uses include residential areas, aquatic areas, forests, rights of way, ornamentals and turf.

Once the Federal Register notice publishes, the public will be able to submit comments on EPA’s proposed decision at <https://www.regulations.gov/docket?D=EPA-HQ-OPP-2009-0361>. Public comments will be due 60 days after the date of publication in Federal Register. EPA’s responses to the comments received on the draft ecological and human health risk assessments and the benefits assessment will be in the docket.

Find more information about glyphosate, including this proposed interim decision and supporting documents at <https://www.epa.gov/ingredients-used-pesticide-products/glyphosate>

See the glyphosate draft risk assessments and supporting documents at <https://www.epa.gov/ingredients-used-pesticide-products/draft-human-health-and-ecological-risk-assessments-glyphosate>.

### Fund Established to Help Farmers Recover from Nebraska Flooding

Farm Bureau members across Pennsylvania and the nation have rushed to help their fellow farmers in Nebraska as they recover from devastating floods that rocked the state last month, destroying crops and farms and killing livestock.

Nebraska Farm Bureau Federation has established a relief fund to help the state’s farmers as they recover. Donations are tax-deductible and 100 percent of the money donated will be distributed to Nebraska farmers, ranchers and rural communities affected by the floods.

Donations can be made online at [www.nefb.org/get-involved/disaster-assistance](http://www.nefb.org/get-involved/disaster-assistance). Checks made out to Nebraska Farm Bureau Foundation can also be mailed to Nebraska Farm Bureau Foundation; Attn: Disaster Relief Fund; P.O. Box 80299; Lincoln, NE 68501-0299.

Nebraska Farm Bureau has also launched an online message board to help connect farmers seeking help with those offering assistance. It’s available at [www.nefb.org/ag-disaster-exchange](http://www.nefb.org/ag-disaster-exchange).

*From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April 2019.*

## State News Briefs

### Proposed Tax Credit Aims to Help Beginning Farmers

A new proposal aims to give landowners an incentive to help beginning farmers get established.

Senate Bill 478—sponsored by state Sen. Elder Vogel, a Beaver County farmer and chair of the Senate Agriculture and Rural Affairs Committee—would establish an income tax credit for landowners who lease or sell land, buildings and/or equipment to beginning farmers.

The measure would allow for a one-time tax credit for property sold to a beginning farmer or a multi-year credit for property leased. The one-time credit would equal 5 percent of the sale price—which must be at fair market value—with a maximum credit of \$32,000. The multi-year credit would be for 10 percent

*(continued on page 6)*



**OUTSTANDING**  
SEED COMPANY, LLC  
BREEDER | PRODUCER

Outstanding Seed is dedicated to providing the highest possible quality seed and customer service.

Outstanding Seed's focus is breeding, and production of high yield potential, industry leading, Powdery mildew resistant pumpkin, gourd, and winter squash hybrids.

Outstanding Seed hybrids are bred for yield, in addition to PMR, and fruit type. For this reason, Outstanding Seed hybrids are market leaders in yield potential and thus profit potential.

Because we sell only what we breed and/or produce, and focus on pumpkin, gourd, and winter squash, we are able to provide a large amount of product, and cultural practice information for our customers.

Call us today to request a catalog, or place an order. Need help matching the right hybrid with your specific needs? Call today to speak with our experienced seedsmen.

**Sales Office: 877.248.4567**  
**Main Office: 800.385.9254**  
**www.outstandingseed.com**



**Benchmark F1  
Pumpkin**

- Powdery mildew resistant
- Fruit average 20 to 30 lbs.
- Semi-bush plant
- Distinctive extra-large handles



**Moon Light F1  
Pumpkin**

- Powdery mildew resistant
- Fruit average 18 lbs.
- Large vine
- White, flat fruit, excellent for stacking



**Conquest F1  
Pumpkin**

- Powdery mildew resistant
- Fruit average 30 to 50 lbs.
- Large vine
- Excellent yield potential



**Rembrandt F1  
Pumpkin**

- Powdery mildew resistant
- Fruit average 15 to 20 lbs.
- Large vine
- Varying shades of pink and blue; perfect for mixed bins or retail



**Summit F1  
Pumpkin**

- Powdery mildew resistant
- Fruit average 30 to 40 lbs.
- Semi-bush plant
- Large, dark orange fruit with good ribbing



**Moon Whisper F1  
Pumpkin**

- Powdery mildew resistant
- Fruit average 14 lbs.
- Large vine
- Flat, white fruit, excellent for stacking

## NEWS

**State News Briefs...** *(continued from page 4)*

of the gross rental price with a maximum credit of \$7,000 per year for up to three years.

The bill outlines criteria defining who is a beginning farmer, including excluding individuals who have been actively engaged in farming for more than 10 years.

The proposal, based on a similar program that has been successful in Minnesota, aims to help get the next generation started in an industry facing the challenge of an aging workforce. For every four farmers in Pennsylvania that are age 65 or older, there is only one farmer under the age of 35. And of the 7.7 million acres of farmland across the Keystone State, 41 percent is managed by a farmer 55 or older.

Pennsylvania Farm Bureau helped introduce the proposal and believes that helping young farmers pick up the reins and get established is critical to continuing Pennsylvania's agricultural legacy and the important contributions farming makes to our state's economy and way of life. And with no neighboring states offering such a program, PFB believes a tax incentive in Pennsylvania could make the state a regional leader in attracting the next generation of farmers.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, April 2019.*

**Senate May Consider Sunday Hunting Legislation**

A bill opposed that would effectively expand Sunday hunting in Pennsylvania recently cleared the state Senate Game and Fisheries Committee.

The 8-3 vote sends Senate Bill 147 to the full Senate for consideration. The bill would give the Pennsylvania Game Commission full authority to allow for Sunday hunting in its establishment of seasons and bag limits.

Pennsylvania Farm Bureau members oppose Sunday hunting and believe the bill would exacerbate the issue of hunting-related trespass and disrupt the current arrangement that allows both hunters and other outdoor enthusiasts a day to enjoy our state's wilderness without coming into conflict with each other. While the bill would strengthen penalties for hunting-related trespass, it does not address many other concerns and policy objectives farmers have related to Sunday hunting.

*PVGA members also expressed their opposition by at 2 to 1 margin to Sunday hunting in the 2019 Membership Survey.*

PFB is urging farmers across the state who oppose expanding Sunday hunting to contact their legislators to make their voices heard. That can be done by responding to PFB's Action Alert at <http://bit.ly/2NlvdGp>.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, April 2019.*

**Push to Allow Wider Farm Equipment Gaining Traction**

Legislation that would allow farmers to move wider equipment on roadways has cleared its first hurdle in the General Assembly.

Senate Bill 338, sponsored by Rep. Wayne Langerholc of Cambria County, cleared the Senate Transpiration Committee and now heads to the full Senate for consideration.

The measure would allow farm equipment up to 18 feet wide to operate on roadways under certain safety restrictions. Currently, farmers can move equipment up to 16 feet wide on roadways within 50 miles of their farm, as long as they meet certain safety standards including flashing amber lights, escort

vehicles and signs. The bill would update the vehicle code to allow for equipment up to 18 feet in width to be moved on roadways, following these current safety standards and restrictions.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, April 2019.*

**Hunting-Related Trespass Bill Advances**

A bill that would strengthen Pennsylvania's hunting-related trespass laws to deter hunting on private land without permission passed the House Game and Fisheries Committee.

House Bill 446, sponsored by Rep. Brett Miller of Lancaster County, now heads to the full chamber for consideration.

Currently, hunting-related trespass is a secondary offense, which means a hunter must be found in violation of another offense before a Game Warden or other law enforcement officer can cite him or her for it. This bill would make hunting-related trespass a primary offense, enabling officers to cite hunters who are caught hunting on private land without permission regardless of whether another violation occurred. In addition, repeat offenders would face the suspension of their hunting privileges.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, April 2019.*

**Bill to Compensate Landowners for Drilling Ban Advances**

An effort to compensate landowners who have been prevented from taking advantage of natural gas drilling opportunities because of the Delaware River Basin Commission's drilling ban has cleared its first hurdle in the General Assembly.

House Bill 827, sponsored by Rep. Jonathan Fritz, passed the House Environmental Resources and Energy Committee and now heads to the full chamber for consideration.

The bill would require that landowners prevented from having gas production occur on their property by the commission's moratorium be compensated with the same calculation used to determine value in eminent domain actions.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, April 2019.*

**Lyme Disease Bill Moves in State House**

A bill that expands Lyme disease patients' access to treatment options has been primed for a vote by the state House.

The House Health Committee advanced House Bill 629, referring it to the full chamber for consideration. The bill, sponsored by Rep. Kathy Rapp of Warren County, would require health insurance companies to cover longer courses of treatment for Lyme disease and other tick-borne illnesses.

Pennsylvania has the highest reported cases of Lyme disease in the nation and farmers are particularly at risk due to the amount of time they spend outside and near habitats favored by ticks.

*From the Pennsylvania Agricultural Alliance Issues Update, Penna. Farm Bureau, April 2019.*

**DEP Proposes Hiking Permit Fees**

The Pennsylvania Department of Environmental Protection is proposing to increase permit fees for farms and other businesses needing water quality permits.

If adopted, the plan would substantially increase costs for farmers, especially animal farm operators, who must obtain fed-

*(continued on page 8)*



# BiO 360

Biodegradable | Compostable Mulch Film®



Made from Mater-Bi



BPI Certification



No negative impact on soil



Suitable for many types of crops



Several thicknesses available



Sustainably produced



Nolt's Produce Supplies  
 717-656-9764 - Leola, PA  
 noltsproucesupplies.net  
 For other regions, contact us  
 1-844-4BIO360 (1-844-424-6360)



## NEWS

**State News Briefs...** (continued from page 6)

eral or state water quality permits to operate or build structures on their farms.

Pennsylvania Farm Bureau opposes the measure and believes the proposed fees are excessive and burdensome, and that these costs cannot be simply passed on to the customer, as they might be in various other industries. In addition, there is no oversight mechanism in place to prevent future fee hikes.

Written comments on DEP's proposed fee increase may be submitted through May 14. Farmers are encouraged to submit comments in opposition addressed to Patrick McDonnell, Chairman; Environmental Quality Board at:

Regular Mail: P.O. Box 8477; Harrisburg, PA 17105-8477

Express Mail: Rachel Carson State Office Building, 16th Floor; 400 Market Street; Harrisburg, PA 17101-2301

Email: [RegComments@pa.gov](mailto:RegComments@pa.gov)

Include your name and address and note at top of your comments that you are commenting on "DEP Proposed Rulemaking of March 30, 2019 – Water Quality Permit Fees." A public hearing is also scheduled for May 1 at 1 p.m. in the agency's Southcentral office.

**Nominations Open for Leopold Conservation Award**

Pennsylvania farmers who have gone above and beyond in caring for natural resources are encouraged to apply for the prestigious Leopold Conservation Award. The nomination period for the 2019 award is open now through Aug. 1.

Given in honor of renowned conservationist Aldo Leopold, the \$10,000 award recognizes landowners who inspire others with their dedication to land, water and wildlife habitat management on private, working land.

Sand County Foundation, the nation's leading voice for conservation of private land, presents the award to private landowners in 13 states. This is the second year the award has been offered in Pennsylvania, where it is presented in partnership with Pennsylvania Farm Bureau and Heinz Endowments.

"We are excited about the opportunity to once again encourage farmers to participate in the Leopold Conservation Award application process after a successful inaugural effort in 2018," PFB President Rick Ebert said. "We are proud of the thousands of farmers across the state who have demonstrated a strong commitment to enhancing the environment through conservation and best management practices that improve soil health and water quality, while reducing erosion."

Nominations for the 2019 award—which will be presented at the 2020 Pennsylvania Farm Show—may be submitted on behalf of a landowner, or landowners may nominate themselves. The application can be found at: <https://sandcounty-foundation.org/uploads/PA-2019-CFN.pdf>.

Applications may also be mailed to: Pennsylvania Farm Bureau; c/o Joel Rotz; PO Box 8736; Camp Hill, PA 17001-8736.

From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April 2019.

**Spotted Lanternfly Quarantine Zone Expanded in Pennsylvania**

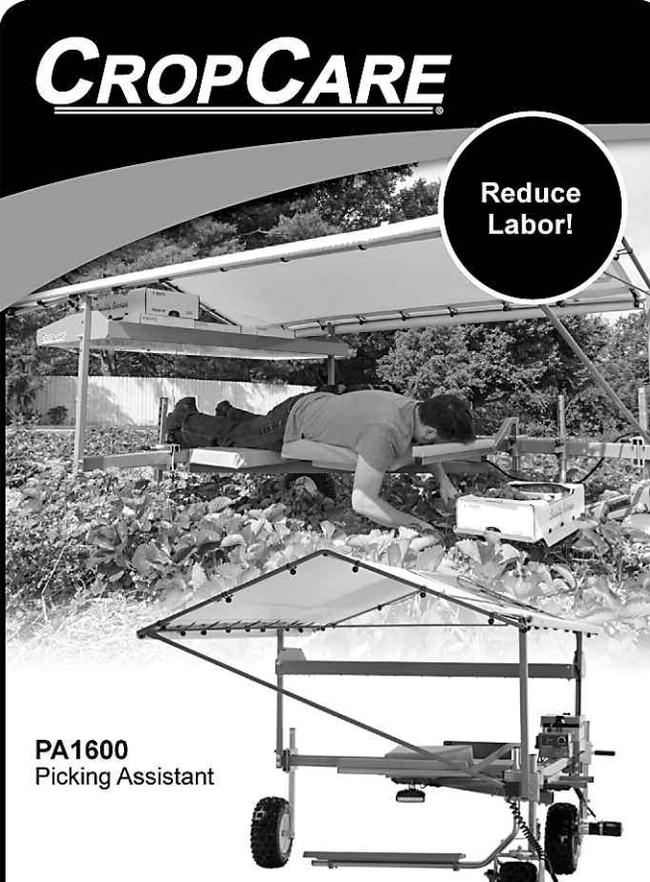
The Spotted Lanternfly has been identified in Dauphin County, which was previously located outside of the quarantined zone. Dauphin County joins thirteen other southeast counties which have been quarantined by the Pennsylvania Department of Agriculture.

The quarantine restricts the movement of items that may contain egg masses, nymphs or adults of the SLF. Businesses are required to obtain a permit and take an online training course to help them to identify different life stages of the SLF and prevent its movement. Inspection of businesses will begin on May 1, 2019 by the Bureau of Plant Industry to verify that the required permits have been obtained and that employees have been educated on this destructive agricultural pest.

From the **Pennsylvania Agricultural Alliance Issues Update**, Penna. Farm Bureau, April 2019.

CROPCARE

**Reduce Labor!**



**PA1600**  
Picking Assistant

The Picking Assistant is a motorized field hand designed to boost your picking productivity and reduce sore backs! It features adjustable height & width, variable speed controller, an all-weather canopy and a solar powered charging system.

CropCareEquipment.com | Lititz, PA  
Manufactured by PBZ LLC, a Paul B. Zimmerman, Inc. company

Please contact your local CropCare® dealer with any questions.

**Cedar Grove Farm Store**  
Shippensburg, PA....717-532-7571

**Martin's Repair Shop LLC**  
Ephrata, PA.....717-733-3015

## Penn State Conducting Agritourism Survey

Penn State Extension invites you to complete their agritourism survey. One question they often hear in extension is "Can agritourism help me stay or become profitable?" With this survey they would like to find the answer for this question in Pennsylvania. This survey is for you if you are an agritourism operator or if you are planning to develop an agritourism enterprise on your farm. They would like to know about success factors and barriers to develop a successful agritourism business in Pennsylvania.

*An agritourism operation is defined as a working farm that offers activities for the enjoyment, education, and/or active involvement of visitors to the farm.*

To participate in the survey, please go to the following link: [https://pennstate.qualtrics.com/jfe/form/SV\\_a5YGUrYHvh7dSr\\_X](https://pennstate.qualtrics.com/jfe/form/SV_a5YGUrYHvh7dSr_X). Be assured that your responses are completely confidential; only statistical summaries will be used in reports, so that no individual person's responses will be identifiable.

If you have any questions about this survey or its outcomes, please contact Claudia Schmidt at 814-863-8645 or [cschmidt@psu.edu](mailto:cschmidt@psu.edu). Dr. Schmidt is a new faculty member at Penn State interested in learning how she can help Pennsylvania growers be more profitable. She would very much appreciate your help with this project.

## Agri-tourism Liability Bill Being Considered

The Pennsylvania State Grange was delighted to see a sponsorship memo circulated by freshman state Rep. Barb Gleim, R-Cumberland, on limiting farmers' liability if they engage in an agri-tourism or agri-entertainment activity.

"We are encouraged by Rep. Gleim's leadership on this issue," said Pennsylvania State Grange President Wayne Campbell. "Family Farms, particularly struggling Pennsylvania dairy farmers, are looking for ways to diversify their operation in order to survive. One option is to have other activities which could range from pick-your-own fruit to corn mazes. Too often, fear of a frivolous lawsuit discourages them from doing so."

Campbell said that a farmer who is negligent on safety should be held accountable. "It is where a natural and inherent risk such as tree roots or a bumpy wagon ride causes an injury that farmers need to reduce their liability. Obviously, there should be signs reminding visitors that there are inherent dangers and care must be used when visiting a working farm."

Similar laws have already been enacted in other states, including neighboring Ohio. Although having 33 co-sponsors, Rep. Gleim has not yet formally introduced this legislation since additional House members are asking to co-sponsor her bill.

*From the Pennsylvania State Grange*

## ProducePackaging.com® for all your produce packaging needs

**1-800-644-8729**  
Kurt Zuhlke & Assoc., Inc.  
P.O. Box 609, Bangor, PA 18013



### *Over 45 Years In The Industry*

For over 45 years, Kurt Zuhlke & Assoc., Inc. has been a part of the many innovative packaging concepts utilized by the produce industry.



### *High Quality Products And Services*

Our packaging is designed to protect produce, provide excellent visibility to the consumer, reduce shrinkage and enhance the product. We also offer professional labeling design and application.



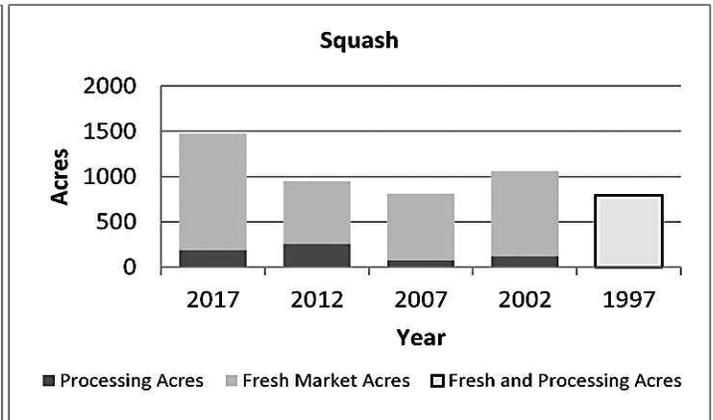
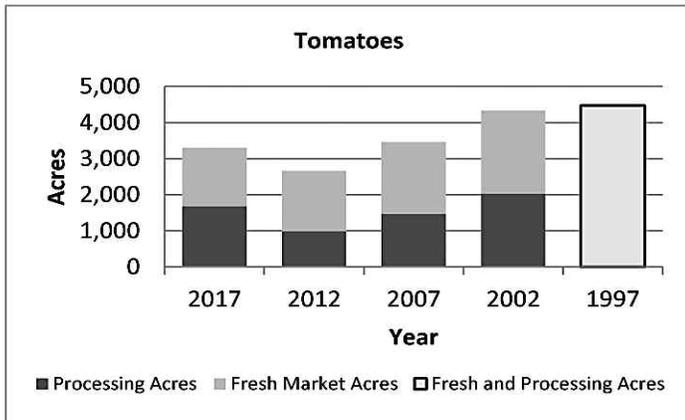
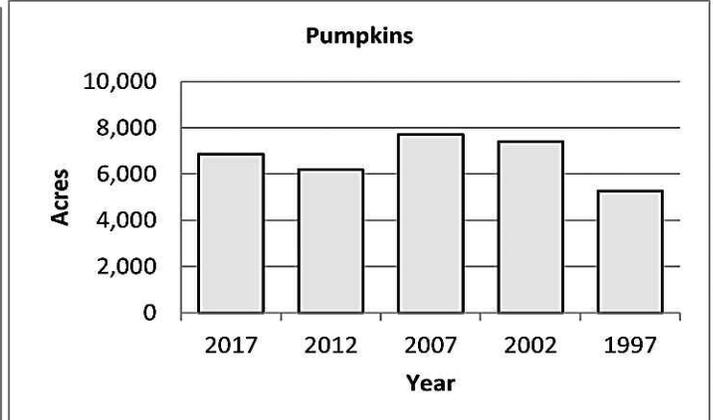
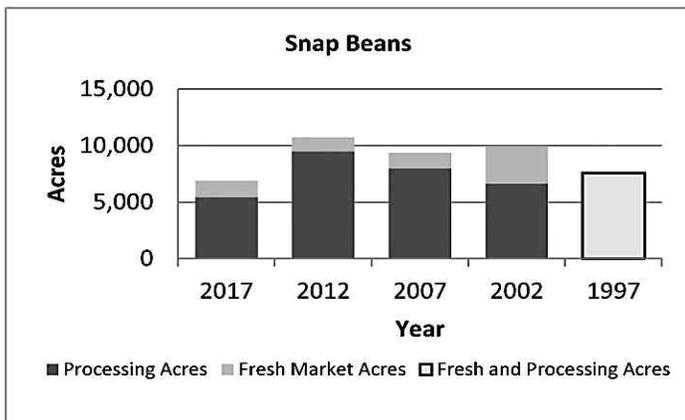
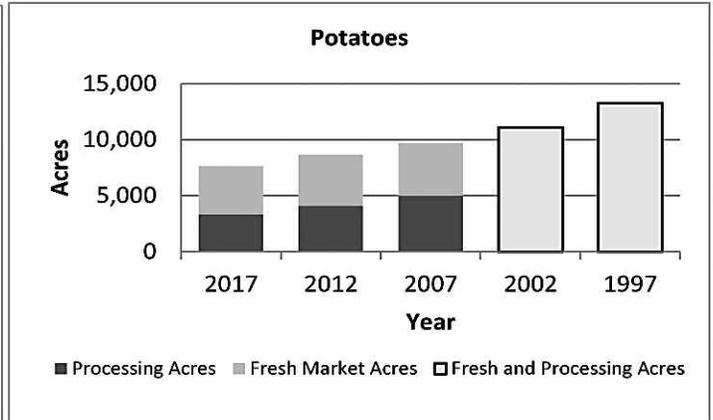
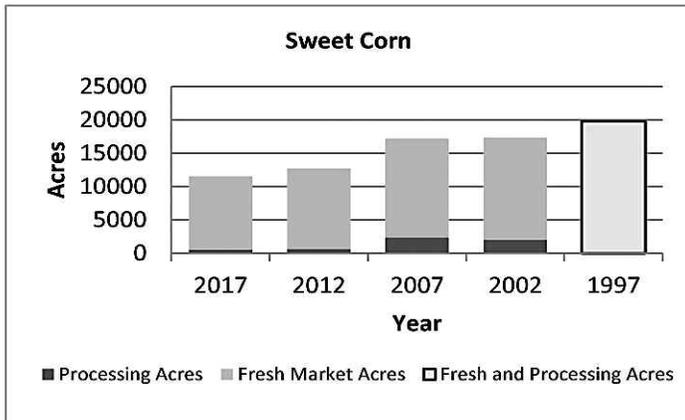
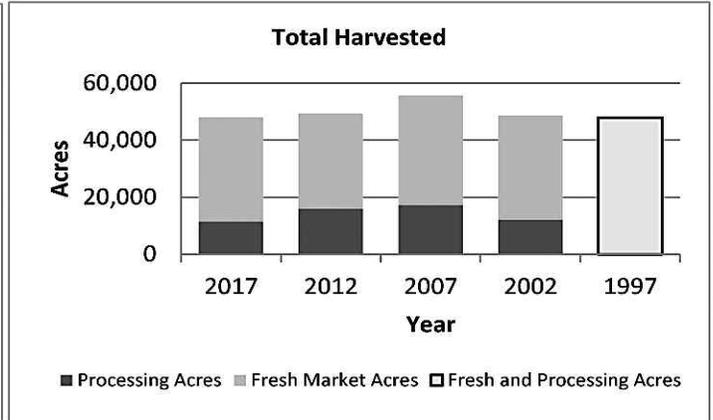
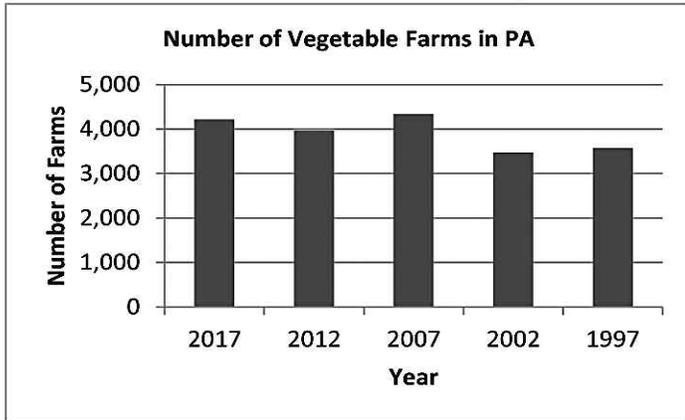
### *From Farmers To Repackers*

Whether you are ordering a case or a truck load, you can rest assured that we have the ability and capacity to service your orders quickly.



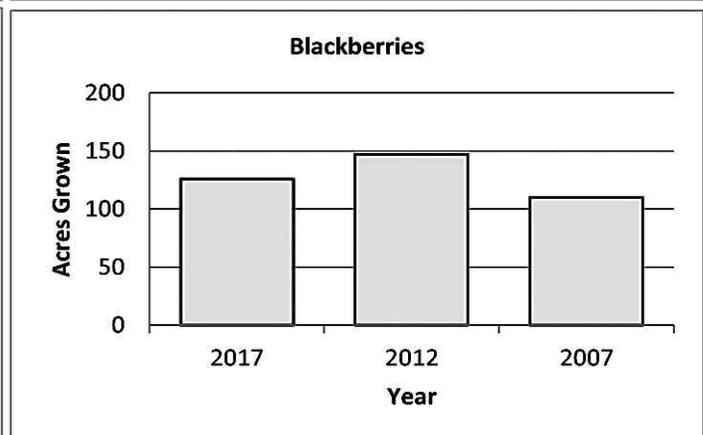
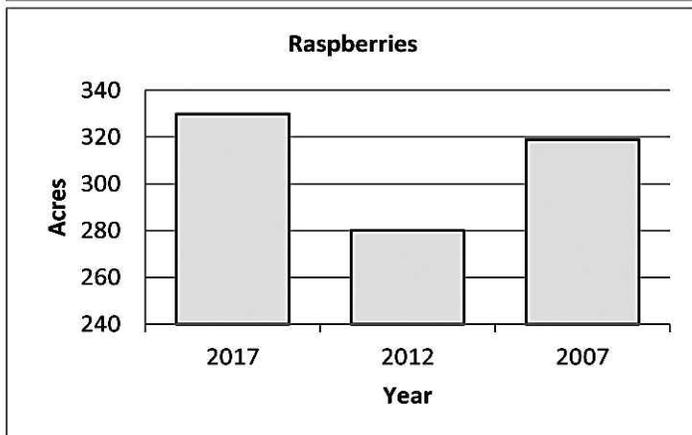
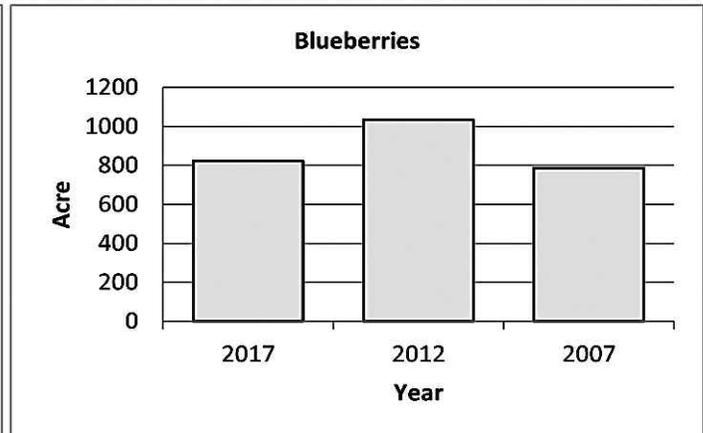
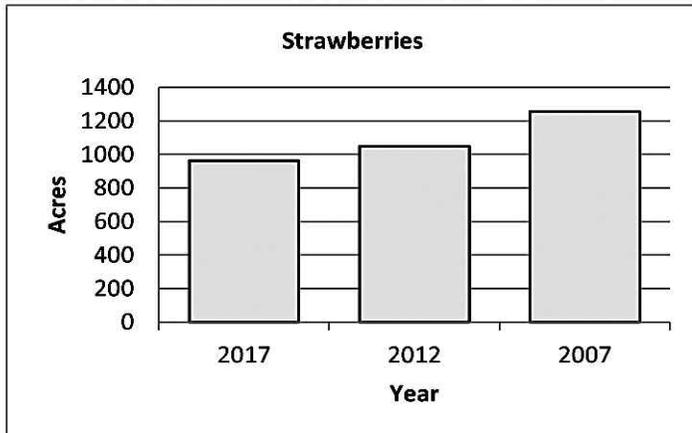
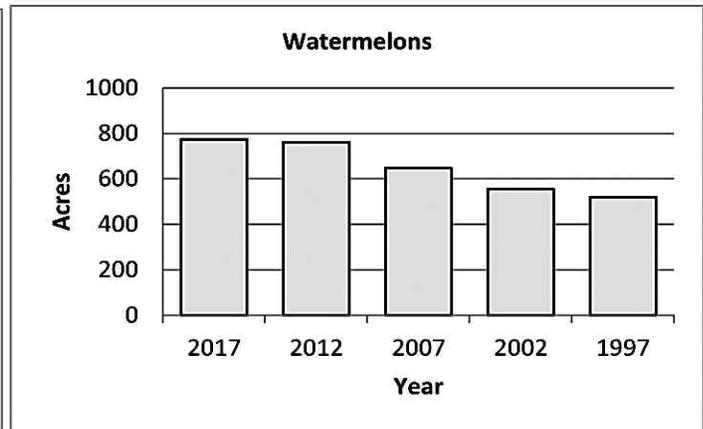
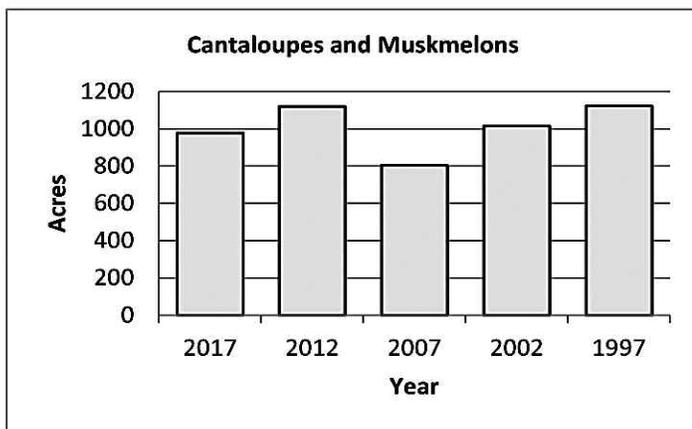
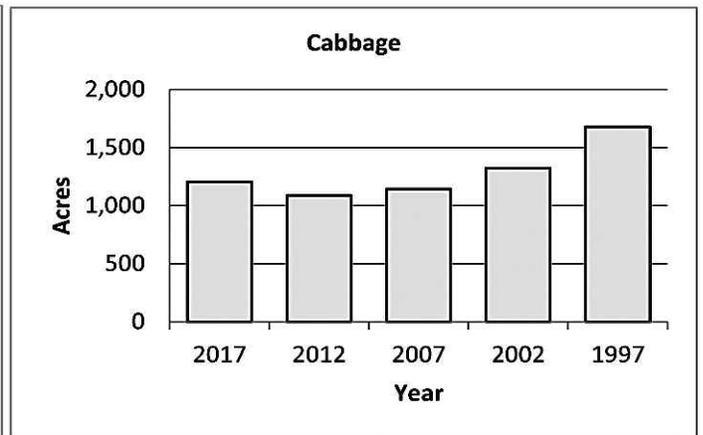
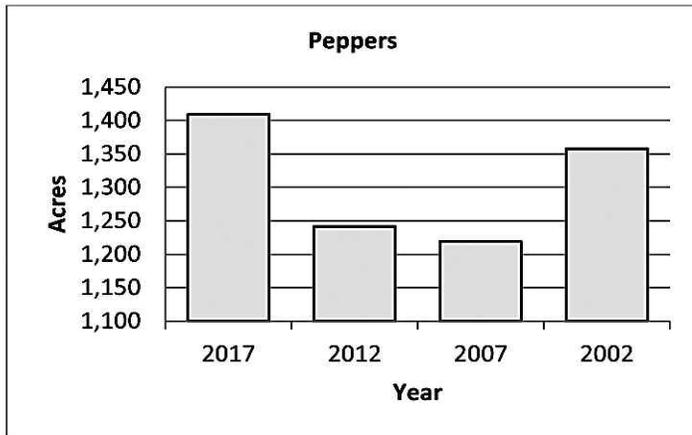
NEWS

**Vegetable Ag Census Statistics** (continued from page 1)



NEWS

**Vegetable Ag Census Statistics** (continued from page 10)

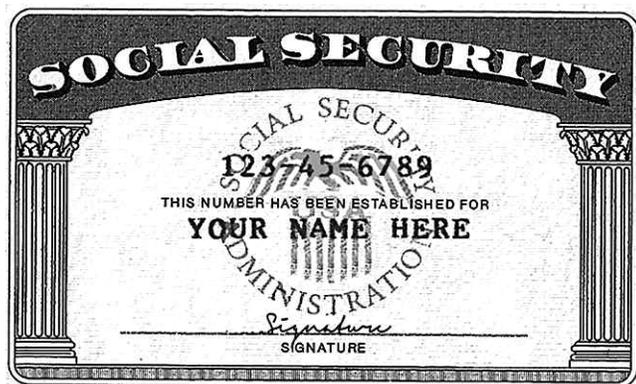


## LABOR

## Social Security No-Match Letters are in the Mail

Richard Stup

Many employers and payroll service providers are finding unwelcome correspondence in their mailboxes, Social Security “no-match” letters are back. A no-match letter means that the Social Security Administration (SSA) has found one or more employee records submitted by the employer that doesn’t match either the name or social security number that SSA has on file. Examples of these notices can be found on SSA’s website. During the Obama administration, SSA stopped sending no-match letters altogether, but the Trump administration decided to resume them. Many employers will remember that during the Bush administration these letters were sent frequently and employers had a specific process to follow in order to get “safe harbor” from legal consequences while the issue was sorted out. Unfortunately, the Bush era “safe harbor” rules are no longer in effect and employers will need to navigate some uncertain decisions.



### “Constructive Knowledge”

The problem for employers is that immigration officials and prosecutors consider an employer’s receipt of a no-match letter from SSA as evidence of “constructive knowledge” that an employee may not be authorized to work in the U.S. Essentially, “constructive knowledge” is a legal term indicating that a reasonable person, given the facts and information available to them, should be able to infer that the employee is not authorized to work. U.S. Immigration and Customs Enforcement (ICE) will ask for no-match letters when conducting records audits or other enforcement actions. Employers who knowingly employ individuals who are not authorized to work are in violation of current immigration laws and are in jeopardy for fines and criminal prosecution.

### Proceed With Caution

Simply ignoring a no-match letter is not a good option because ICE could consider the employer to have “constructive knowledge” and to be willfully employing an unauthorized person. Furthermore, SSA does share information with ICE so immigration enforcement actions such as an audit could be prompted by no-match letters. However, employers shouldn’t just fire an employee, or take any other adverse employment action, based on receiving a no-match letter. A no-match letter alone is not an indication that an employee is not authorized to work in the U.S. In fact, the no-match letter says it “does not address your employee’s work authorization or immigration status.” There could be a simple explanation for a mismatch such as a number getting transposed on a document or the person’s

name changed, such as through marriage, but they failed to notify SSA. If an employer takes adverse action against an employee, such as firing, simply based on a no-match letter, then they could be sued for discrimination. The no-match letter states: “You should not use this letter to take any adverse action against an employee, such as laying off, suspending, firing, or discriminating against that individual, just because his or her SSN or name does not match our records. Any of those actions could, in fact, violate State or Federal law and subject you to legal consequences.”

### Next Steps

Employers who receive a no-match letter will first need to create an account and login to SSA’s Business Services Online. Unlike the letters from years ago, the new letters don’t include the names and social security numbers that are in error, you have to log-in to SSA’s site to even learn which employees are referenced.

After the employer retrieves the list of employees with information that does not match SSA records, check business and personnel records to determine if a typographical error is the source of the discrepancy. If such an error is found, the employer can file a form W2-C to correct the information with SSA. More information about this correction process is contained in SSA’s Business Services Online and it should be completed with 60 days of receiving the no-match letter. Of course, it’s a good practice to verify that the correction took place and to document all employer actions.

If the employer finds no typographical or clerical error, then you will have to involve the employee in resolving the discrepancy. Inform the employee about the no-match letter from SSA and ask the employee to verify the accuracy of the information in your business records with the information found on their social security card. Instruct the employee to follow up directly with the SSA to resolve any discrepancies. Finally, document all of your business actions to show that you took reasonable steps to address and resolve the matter.

For more information, see the following related posts:

From the Michael Best law firm: <https://www.michaelbest.com/Newsroom/205321/Social-Security-No-Match-Letters-Return>

From Western Growers: <https://www.wga.com/blog/ssa-distributes-no-match-letters-tax-year-2018>

Employers with specific questions about dealing with no-match letters or other employment situations should seek legal counsel.

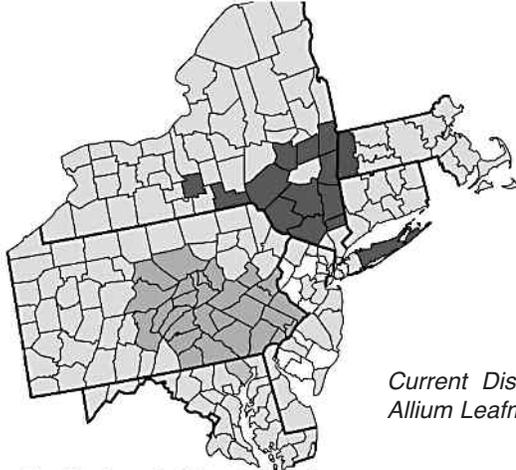
*Mr. Stup, Cornell University. Permission granted to repost, quote, and reprint with author attribution.*



# Allium Leafminer: First Emergence in Pennsylvania

Shelby Fleischer, Brandon Lingbeek, Tim Elkner

The allium leafminer, *Phytomyza gymnostoma*, is an invasive fly species<sup>1</sup> that originates from Europe, is now confirmed in 5 states. The fly infests plants in the Allium genus, including leeks, onion, garlic, chive, shallot, green onion, wild, garlic chives, and ornamental Alliums.



Current Distribution of Allium Leafminer

Allium leafminer overwinters as pupae and emerge in the spring. Field scouting has detected 1st emergence between April 16-19 in Perry, Lancaster, and Northumberland counties. We expect the adult flight to occur over the next 2 to 5 weeks. Protecting your crops over this time will go a long way towards managing this pest.

Adult females puncture leaves in a linear pattern with their ovipositor for feeding and egg laying (Figure 1). Leaves from infested plants can be wavy, curled and distorted (Figure 2). Larvae mine leaves moving towards and into bulbs and leaf sheathes (Figure 3) where they pupate (Figure 4). Peel back the leaves to find the insect. Both the leaf punctures and mines serve as entry routes for bacterial and fungal pathogens. After this spring flight, the larvae or pupa have a summer aestivation (dormancy) period, and a fall flight. In past years, fall flight in Pennsylvania has started anywhere from very late September or well into October. If you can protect your crop during spring and fall flight times, you should be free of damage. The adult fly (Figures 1, 5, 6, 7) has a charismatic orange face, yellow "knees" (end of femurs), and matte black body. At 3mm-4mm, the adult is small (larger than a fruit fly but much smaller than a house fly). Eggs are laid in or on plant tissue, and larvae are well embedded into the plant tissue. The timing of planting and harvest affect risks of damage. We seem to be getting most damage to allium crops that are showing strong vegetative growth at the time of adult flight activity. Row covers or insecticides during the flight period should prevent damage. We have found efficacy using neonicotinoids (Scorpion, Assail), diamides (Exirel), spinosyns (Entrust, which is OMRI-labelled, Radiant), and pyrethroids (Warrior). A 1 <http://ento.psu.edu/extension/vegetables/pest-alert-allium-leafminer> Current distribution of Allium leafminer. spreader-sticker is recommended when applying insecticides to the waxy leaf coating of alliums.

(continued on page 14)

Your Source for . . .

# HIGH TUNNELS

**RIMOL**  
Greenhouse  
Systems, Inc.

Call Harry Edwards @ 717.606.8021  
or Email [hedwards@rimol.com](mailto:hedwards@rimol.com)

## TEW MANUFACTURING CORP.

**Fruit & Vegetable Cleaning & Sizing Equipment & Parts**

**Quality Latex & Poly Sponge Rubber Drying Donuts**

**Tuff Foam® Protective Padding**

**Brushes • Bearings • Sizing Chains**

**Belting • Scrubber Rubber**

**New Stainless Steel Machines**

**CALL TOLL FREE 800-380-5839 FOR CATALOG & PRICES**

TEW MFG. CORP. 585-586-6120  
P.O. BOX 87 FAX: 585-586-6083  
PENFIELD, NY 14526 [www.tewmfg.com](http://www.tewmfg.com)

VEGETABLE PRODUCTION

Allium Leafminer... (continued from page 13)



Figure 1. Female puncturing leaf with ovipositor. Note linear puncture marks, which is a sign of adult activity. Photo: T. Elkner.

Figure 3. Larvae feeding in onion. Photo: S. Spichiger.



Figure 4. Pupae in base of allium plants. Photo: L. Donoval.



Figure 2. Twisted leaves of infested crop. Photo: L. Donoval.

Figure 5. Adult. Top view. Adults have a yellow patch on their heads and yellow knees.



Dr. Fleischer and Mr. Lingbeek are with the Department of Entomology at Penn State University.

Figure 6. Adult, preserved specimen. Note yellow head patch and yellow knees. Photo: N. Sloff.



Figure 7. Adult. Side view.



**KOOLJET**  
RELIABLE REFRIGERATION SYSTEMS

Authority in Refrigeration for Food Processing and Agricultural Industry

- THRU-THE-WALL
- ROOF-MOUNTED
- PORTABLE
- HYDROCOOLERS
- CUSTOM DESIGNS
- BLAST FREEZERS
- CHILLERS
- GREENHOUSE COOLERS

PLUG AND PLAY

Made in North America

1.866.748.7786 ONE PIECE DESIGN FREE COOLING

OUR COMFORT ZONE

# Viable Options for Managing Allium Leafminer in Organic Onion Production 2018

Gladis Zinati and Andrew Smith

Allium leafminer (ALM), a recent invasive herbivore pest, was confirmed in Lancaster in December 2015 and expanded in spring 2016 to Berks, Chester, Lehigh, Dauphin, and Delaware counties in Pennsylvania. This is a specialist pest that infests plants in the allium family such as onion, leeks, and garlic. Adult and larvae growth stages cause economic damage directly by adults laying eggs on leaves where they tunnel through leaves until they reach allium bulbs to pupate, with yield loss due to culls or non-marketable products.

In 2016, vegetable growers responded to a survey, conducted by the Pennsylvania Vegetable Growers Association (PVG), indicating research is needed on the impact of plastic mulch, crop rotation and ALM in organic systems. At Rodale Institute, a two-year research project was established in 2018 to evaluate cultural and biological options for managing ALM for organic onion production. Funding by PVGA for year one allowed us to expand our data collection over more sampling dates during the yellow onion growing season in 2018.

The goal of this project was to evaluate the impact of plastic mulch color, cover crop mixtures and the use of row cover on reducing the ALM damage and onion yield. This project will empower allium growers with knowledge and scientifically-based information on viable cultural and biological tools that will improve early detection and management of ALM, and produce greater organic onion yields. The specific objectives of this project were to: 1) Assess the use of different colors of sticky card traps to monitor ALM for early detection and beneficial insects

on a weekly basis after planting; 2) Assess plants of three onion varieties for ALM damage grown on plastic mulch and nonplastic mulch and for yield and final damage of onion bulb; 3) Assess the impact of cover crop type on ALM early detection, damage, and onion yield; and 4) Monitor percentage of mycorrhizal colonization and assess its impact on ALM and onion yield.

## Materials and Methods

A field experiment was set-up at Rodale Institute in fall 2017. The experimental design was a split-split-split block design with four replications. The treatments included two cover crop mixtures (as main plot), three colored plastic mulches (black, silver reflective, and red mulches, sub-plot) (Photo 1), three yellow onion varieties (Cortland, Telon, and Sedona, as sub-sub-plot), and row cover (0, 1, and 1.5 month as sub-sub-sub-plot).



Photo 1 Aerial view of experimental layout

(continued on page 16)

## Be Prepared When The Weeds Start To Grow



### ← Hillside Cultivator Model CS

The best cultivator for strawberries and between plastic mulch.

The best cultivator for in row weed removal. →

### Eco Weeder



## Hillside Cultivator Co. LLC

911 Disston View Dr., Lititz, PA 17543  
717-626-6194 www.hillsidecultivator.com

# SOLO SPRAYERS

We carry a full line of Solo Sprayers from hand pump to engine driven units.  
Call us today for your spraying needs.

We ship UPS

**PARTS • SALES • SERVICE**



27 West Mohler Church Road,  
Ephrata, PA 17522  
Ph: 717-733-3015



VEGETABLE PRODUCTION

**Viable Options for Managing...** (continued from page 15)

One cover crop mixture included white Dutch clover, oats, rye and sunflower (mycorrhizal inducers) whereas the second cover crop mixture included brassicas such as rape, white mustard and tillage radish (non-mycorrhizal inducers). Another section on the same field was cropped with the above-mentioned onion varieties on bare-ground. Only Talon was covered with either 0 or 1 month period of row cover while the other two varieties were covered for 0 month. Seedlings of onions were started in the greenhouse at Rodale Institute in February 2018.

Soil samples were collected early in March before any field activities started (plowing, bed preparation, etc.) These samples were stored in the refrigerator, then serially-diluted into containers (10-1 through 10-4) and planted with Bahia grass in the greenhouse for 6 weeks (Photo 2).



Photo 2. Showing preparation of soil dilutions, growing Bahia grass in the greenhouse for determining the most probable number (MPN) of mycorrhizal fungi on Bahia grass.

Then they were assayed later in the season for arbuscular mycorrhizal fungi propagule numbers processed and assessed for most probable number of mycorrhizae (MPN). Onion seedlings from all treatments (bare-ground and plastic) were collected at three sampling periods: a) planting, b) three weeks after transplanting, and c) at harvest. Onion roots from these samples are being assessed for percent root colonization by Dr. David Douds.

Onion seedlings were transplanted into 3-row, 6-ft center wide and 5-ft long beds per treatment in April 2018. The neighboring fields were monitored in March to assess emergence of overwintering Allium leaf miner (ALM) adults. Two colors (blue and yellow- Photo 3) sticky cards were used on a weekly basis, between April and end of May, to assess early detection and monitoring of ALM adult flights then in July to detect the second sighting of ALM adults.

Damage signs on onion leaves were recorded each week during the monitoring period. Onion bulbs were harvested in August 2018, cured for three weeks in a greenhouse and assessed for marketable yield. Onion samples that showed signs of ALM damage were harvested separately and the bulbs were assessed for signs of ALM larva and pupa (Photo 4).



Photo 3. Yellow and blue sticky traps used for assessing ALM population and beneficial insects.



Photo 4. Showing ALM larva in onion bulb

**Results**

- 1- ALM and parasitoids (beneficial insects) were more attracted to yellow sticky cards than blue colored-sticky cards.
- 2- A few onion plants that were grown on black plastic mulch, in two out of the four replicates, and previously cropped with mycorrhizal-inducing cover crop mixture (oats, sunflower, Dutch white clover, and rye) showed ALM damage on leaves but not on bulbs. On the other hand, none of the onion plants grown on any plastic mulch and previously cropped with non-mycorrhizal-inducing cover crop mixture (tillage radish, rape, white mustard), showed any evidence of ALM damage on leaves and bulbs.
- 3- Only onion plants grown on bare-ground with no row cover showed ALM damage at the beginning of the season but the leaf damage did not translate into bulb damage but in two bulbs (Cortland and Sedona) with 0 month row cover.

(continued on page 16)

**We get it... It was a tough season!**  
 As fellow growers, we know the disease challenges you faced in the SOGGY 2018 season. For the BEST defense, you NEED a high pressure boom sprayer! That's where we can help! In business over 30 years, our focus is offering a simple, reliable and very effective sprayer.

**Call today**  
**And let's talk sprayers!**  
**570-837-1197**

**pennscreekwelding.com**

VEGETABLE PRODUCTION

**Viable Options for Managing...** (continued from page 16)

- 4- Irrespective of the cover crop mixture, Talon and Cortland onions yielded the least when grown on red plastic mulch (ranged between 9,815 lb/acre and 11,600 lb/acre) and were of similar yield when grown on either black or reflective mulch (11,780 lb/acre to 12,490 lb/acre). However, Sedona onion yields were greatest when grown on black plastic (16,950 lb/acre) after brassica cover crop than those in either red or reflective mulch (11,780 lb/acre). Sedona yields were within the range of Talon and Cortland yields averaging 10,700 lb/acre when grown after non-brassica cover crop.
- 5- In the brassica cover crop mixtures, covering onion seedlings with row cover for 1 month or 1.5 months increased Sedona onion yields (17,500 lb/acre) when grown on either black or silver reflective plastic mulch than those without row cover (averaging 12,500 lb/acre). However, Sedona yields were not significantly different (averaging 11,600 lb/acre) whether they were covered or not covered with row cover and grown in black or silver reflective mulch that was previously cropped with mycorrhizal-inducing cover crop mixtures.
- 6- The mean MPN was 8.43 in soils that was previously cropped to Brassica non-mycorrhizal-inducing and 24.88 in those cropped with mycorrhizal-inducing cover crops. These values are in line with our expectations, as brassica cover crops impede mycorrhizal propagule number and colonization of soil with mycorrhizal fungi.
- 7- Data on percent root colonization of onion roots collected at planting and three weeks after planting are currently being analyzed.

**Outreach and Training/Education**

In the first year of this project, the experimental research site was showcased during the Rodale Institute's field day on July 20, 2018. The field day was very successful and attended by 428 attendees. Printed flyers on the objectives and preliminary results, from year one of this project, were distributed to the visitors. Total of eight interns were trained on this project. Two out of eight were research interns that were hired and trained on this project.

**Discussion**

The information gained from this first year project showed that the yellow sticky card can be used as a viable and quick tool detect the appearance and monitoring of ALM adult early in the season and later in July. Also, it can be useful tool to monitor parasitoids and other beneficial insects that populate during the growing season. Thus, onion growers could benefit from using yellow stick cards early in March through mid-April to detect early emergence and mating of ALM by monitor the surroundings of the fields before transplanting onions. Also, they can use these traps when installed between onion seedlings throughout the growing season.

Our results showed that ALM female adults started to show signs of laying eggs and signs of damage on onion leaves start two weeks after transplanting onion seedlings into bare-ground beds that were previously cropped to mycorrhizal-inducing cover crops. It is important to note that these seedlings were not covered with row cover. However, signs of ALM damage start to show three weeks after transplanting onion seedlings into bare-

(continued on page 30)

**lambert**

**PREMIUM PROFESSIONAL PEAT-BASED SUBSTRATES**

**lambert LM-GPS**  
Professional Germination, Plug and Seedlings

**lambert LM-AP**  
Professional Growing Media All Purpose

**FOR ALL YOUR GERMINATION AND ALL PURPOSE NEEDS**

products available  
**OMRI LISTED**  
Para Producción Orgánica For Organic Use

**JEFFREY P. BISHOP**  
Cell: (315) 480-1900  
Toll Free: (888) 632-8808  
lambertpeatmoss@aol.com  
www.lambertpeatmoss.com

- PA -  
**FARM MARKETS**

*We help you grow your market.*

www.Pafarm.com

## VEGETABLE PRODUCTION

## Enhancing Authority MTZ Safety for Processing Tomatoes

Dwight Lingenfelter and Mark VanGessel

### Overall Summary

- ⟨ Significant early-season injury was observed with most treatments except:
  - Authority MTZ at 6 oz/A PPI at UD-REC
  - Authority MTZ at 6 and 8 oz/A applied PPI at PSU-RS.
- ⟨ At 6 WAP, tomato biomass reduction at UD-REC was observed with Authority MTZ, 12 and 16 oz/A PPI, Authority MTZ, 12 oz/A PRE, and both PRE rates of metribuzin plus Spartan Charge, and Authority Elite.
- ⟨ At 6 WAP, tomato biomass reduction at PSU-RS was at least 25% with Authority MTZ at 16 oz/A PPI, Authority MTZ, 12 oz/A PRE, and both treatments including Authority Elite.
- ⟨ Mid-season at UD-REC, tomatoes recovered with no treatment resulting in more than 15% biomass reduction; at PSU-RS the levels of biomass reduction observed at 3 WAP remained throughout the growing season.
- ⟨ Total yield at UD-REC did not differ between treatments.
  - Authority MTZ at 16 oz/A PPI, and metribuzin at 4.3 oz/A plus Spartan Charge at 5.5 fl oz/A resulted in delayed fruit maturity.
- ⟨ Weed control was acceptable in all treatments, except Authority MTZ at 6 oz/A applied PPI.

### Introduction

Authority MTZ is a pre-packaged herbicide of sulfentrazone and metribuzin, labeled for transplanted tomatoes. The Authority MTZ label mentions control of eastern black nightshade, ivyleaf morningglory, common lambsquarters, and pigweed species; all weeds that are difficult to control with current herbicide programs. The sulfentrazone portion of the product can also help manage herbicide-resistant weed biotypes. There has been little research with this product in the Mid-Atlantic States to help provide guidance to tomato farmers and crop advisors about the appropriate rates. Furthermore, the Authority MTZ label requires a pre-plant incorporated application. Results from the 2017 Pennsylvania Vegetable Marketing and Research Program showed at least 17% stunting with the 6 oz rate, however the tomatoes did recover from that injury. Additional research is needed to determine if application method (i.e., soil surface application vs. mechanical incorporation) can improve tomato safety. Spartan (a product from FMC with only sulfentrazone) is labeled for surface applications before transplanting, without incorporation. Applying sulfentrazone to the soil surface, rather than incorporating it into the root zone, may improve crop safety.

Improved crop safety of metribuzin and sulfentrazone may allow for higher applications rates and improve weed control. Research is needed to determine optimum rate range for Mid-Atlantic growing conditions as well as our weed spectrum. In addition, it is important to evaluate this approach as part of a weed control program, with a postemergence treatment.

### Objectives

- 1-Evaluate metribuzin and sulfentrazone for safety with processing tomatoes under different application strategies; and
- 2-Determine level of early-season weed control from metribuzin and sulfentrazone.

### Procedures

The experiments were conducted in 2018 at the University of Delaware's Research and Education Center (UD-REC) and Penn State's Russell E. Larson Agricultural Research Farm (PSU-RS). UD-REC plots were established in sandy loam soil (79:13:8 sand:silt:clay), 1.1% o.m. and 6.7 pH and PSU-RS site was a silt loam (20:60:20 sand:silt:clay), 1.8% o.m. and 6.7 pH. The field at UD-REC was conventionally tilled with chisel plow and disk. Plots consisted of 2 twin rows of plants on 5 feet centers, each 24 feet long. On May 29, preplant incorporated (PPI) treatments were applied, field-cultivated, and immediately followed by applications of preemergence (PRE) treatments. Processing tomatoes ('Heinz 3402') were hand-transplanted at UD-REC on May 31 with twin rows of plants staggered 9 inches across row and 18 inches apart in the row. At PSU-RS, the field was conventionally tilled and PPI treatments were incorporated with heavy rakes. PPI and PRE applications and transplanting all occurred on June 12. Tomatoes at PSU-RS ('Heinz 3406') were hand transplanted in single row 20 feet long, with plants spaced 15 inches apart. Herbicide rates and timings for UD-REC are listed in Table 1 and for PSU-RS are listed in Table 2. A weed-free and an untreated check were also included. The experiment was conducted as a randomized complete block design; both sites had three replications. A postemergence (POST) herbicide application of Matrix (rimsulfuron) at 2 oz wt/A, metribuzin at 3 oz wt/A plus a nonionic surfactant was made to all plots 3 and 4 weeks after planting at PSU-RS and UD-REC, respectively.

Applications were made with a 6-nozzle boom delivering 20

(continued on page 19)



## 2-ROW CORN PLANTERS

*(Can be used for Sweet Corn, Green Beans, Peas, Pumpkins, Beets, Sunflowers and even more)*





**Pequea Planters  
is known for  
their precision.**



- Pull Type or 3 Point Hitch
- With or Without Fertilizer Attachment
- Dry or Liquid Fertilizer
- No-till or Coventional

- Special Custom Built Planters
- New or Reconditioned
- Vacuum available for wide range of seeds
- Adjustable row width
- Using John Deere row units



**PEQUEA PLANTER**

561 White Horse Road, Gap, PA 17527  
Call for Pricing (717) 442-4406



## VEGETABLE PRODUCTION

### Enhancing Authority MTZ... (continued from page 18)

gal/A at UD-REC and 15 gal/A at PSU-RS. Visual crop response and weed control ratings were made based on appropriate check plot on a scale of 0 to 100. Crop response was evaluated seven times at UD-REC and three times at PSU-RS. A single destructive yield was taken at UD-REC on August 28 when fruit maturity (red/orange tomatoes) was greater than 60%. Eight plants were pulled (4 consecutive plants in two rows) and all fruit was picked and sorted. Weight of the three groups was taken separately; (red/orange), ripening (yellow) and unripened (green) fruit.

#### Results:

**UD-REC.** Tomato response was observed with all treatments. At 4 weeks after planting (WAP) >40% biomass reduction was observed with Authority Elite, Spartan Charge at 5.5 fl oz, and Authority MTZ at 12 and 16 oz/A (see Table 1). Spartan Charge at 3.7 fl oz/A and Authority MTZ, 12 oz/A PPI resulted in 33 and 32% biomass reduction, respectively. Authority MTZ at 6 oz/A PPI was the only treatment that did not differ from either the untreated or weed-free check. At 6 WAP plant biomass was significantly reduced in all treatments except the 6 oz/A PPI and the 8 oz/A PRE of Authority MTZ as compared to the untreated check. At 8 WAP Authority MTZ at 12 and 16 oz/A PPI and Authority Elite resulted in 10, 15, and 12% biomass reduction, respectively. At harvest tomato injury was observed with Authority MTZ at 12 and 16 oz/A PPI, Spartan Charge at 5.5 PRE, and Authority Elite treatments (data not presented). Application method, PPI versus PRE, was not significant, although there was a trend for less injury with PPI applications compared to PRE.

Carpetweed was the only species present where differences in control existed (data not presented). The weed-free treatment of Devrinol showed 75% control, and the lower rates (6, 8 oz) of Authority MTZ PPI treatments provided 82-90% control of carpetweed. All other treatments had greater than 90% control of carpetweed. No significant differences were observed with Palmer amaranth control throughout the entire season. At 4 WAP Palmer amaranth control ranged from 85 to 99% and after the POST application control was  $\geq$ 96% for all treatments. Annual grasses were rated late in the season with all treatments having greater than 93% control. [Weed densities were low in the early season and the broadcast POST application controlled most weeds through mid-season. Late season Palmer amaranth was hand-weeded from plots to prevent seed dispersal.]

**PSU-RS.** Tomato injury at 2 weeks after planting was most severe with metribuzin applied PPI followed by Authority Elite PRE. Injury was significantly higher than Authority MTZ at 10 oz/A applied PPI. This was the same rates as Authority Elite, but Authority Elite also contains s-metolachlor (Dual Magnum) which confounds the interpretation of the results. As a trend, PPI applications of Authority MTZ resulted in less injury than PRE applications. Injury continued throughout the season, with similar injury ratings at 6 weeks after planting and at end of season.

Large crabgrass control was excellent ( $\geq$ 96%) for most treatments except Authority MTZ at 6 and 8 oz/A applied PPI. Redroot pigweed and common lambsquarters control was at

(continued on page 20)

## HEALTHY PREDATORS, PARASITES ON PATROL

### Use Biocontrol To Stamp Out:

- Aphids
- Whiteflies
- Fungus Gnats
- Spider Mites
- Thrips

References available  
in your area.

"I was REALLY  
pleased! I didn't  
see aphids [on the  
tomatoes] during  
the whole grow-  
ing season."

Vernon Weaver  
McAlisterville, PA

Hearty Beneficials **GUARANTEED**  
Call 315.497.2063



IPM Laboratories, Inc.

ipminfo@ipmlabs.com

Since 1981

www.ipmlabs.com

## Refrigerated and Ventilated Cooling Systems for Fruit and Vegetable Storages

- COMMERCIAL REFRIGERATION
- DESIGN, SALES AND SERVICE
- SERVING AGRICULTURE FOR OVER 70 YEARS

Free Consultation and Quote

Call Mike Mager at 585-343-2678



# ARCTIC

REFRIGERATION CO. OF BATAVIA

26 Cedar Street, Batavia, NY 14020

www.arcticrefrigeration.com

## VEGETABLE PRODUCTION

**Enhancing Authority MTZ...** (continued from page 19)

last 95% for all treatments at 3 WAP and remained consistent throughout the season due to the POST application of Matrix plus metribuzin. Eastern black nightshade is a late emerging species and was not rated at 3 WAP, but at 6 WAP all treatments except the lowest rate of Authority MTZ provided  $\geq 92\%$  control.

**Yield.** Tomatoes were harvested at UD-REC when approximately 60% ripeness was observed in the weed-free check. Yield of ripe (red/orange) tomatoes and immature (green) tomatoes showed significant differences between treatments (see Table 3). A significant reduction (34%) of ripe tomatoes occurred with the Spartan Charge, 5.5 fl oz/A and Authority MTZ at 16 oz/A applied PPI. Although not significantly different from the untreated check, fewer ripe tomatoes were recorded with Authority MTZ 12 oz/A PRE treatment as compared to the weed-free check. Authority Elite, Spartan Charge at 5.5 fl oz, Authority 8 oz/A PRE and Authority MTZ 16 oz/A PPI resulted in greater than 55% increase in weight of green tomatoes as compared to the untreated. No significant difference was observed with total yield (ripe + yellow + green tomatoes) or with yellow tomatoes (data not presented).

Table 1. Tomato injury at 4, 6, 8 weeks after planting (WAP) at UD-REC.

Herbicide <sup>1</sup>	Rate/A	Applic. method <sup>2</sup>	% Stunting (4 WAP) <sup>3</sup>	% Biomass Reduction (6 WAP)	% Biomass Reduction (8 WAP)	Cumulative Injury <sup>3</sup>
Untreated check			0	0	0	0
Authority MTZ	6 oz wt	PPI	12 de	6 c	0 a	276 d
Authority MTZ	8 oz wt	PPI	21 cde	16 bc	6 a	679 bcd
Authority MTZ	10 oz wt	PPI	25 cd	16 bc	0 a	705 bcd
Authority MTZ	12 oz wt	PPI	32 bc	25 ab	10 a	1236 abc
Authority MTZ	16 oz wt	PPI	43 ab	36 a	15 a	1720 a
Authority MTZ	8 oz wt	PRE	22 cd	15 bc	2 a	593 cd
Authority MTZ	12 oz wt	PRE	45 ab	32 a	6 a	1366 ab
Metribuzin fb	2.9 oz wt	PPI fb	33 abc	26 ab	7 a	1151 abc
Spartan Charge	3.7 fl oz	PRE				
Metribuzin fb	4.3 oz wt	PPI fb	45 ab	30 ab	3 a	1413 a
Spartan Charge	5.5 fl oz	PRE				
Authority Elite	24 fl oz	PRE	47 a	34 a	12 a	1738 a
Weed-free <sup>4</sup>			6 e	3 c	3 a	220 d
P <sup>2</sup> >P <sup>3</sup>			0.0001	0.0023	0.0624	0.0008

<sup>1</sup>Authority MTZ = sulfentrazone + metribuzin; Authority Elite = sulfentrazone + s-metolachlor; Spartan Charge = sulfentrazone + carfentrazone; Devrinol = napropamide. All plots received a POST treatment of Matrix (rimsulfuron) at 2 oz wt plus metribuzin at 3 oz wt/A plus nonionic surfactant

<sup>2</sup>PPI (preplant incorporated) and PRE (preemergence) applications were made the same day.

<sup>3</sup>Cumulative injury is total injury over the season (total of average injury per day).

<sup>4</sup>PPI treatment of Devrinol at 2 qts/A + metribuzin at 3.5 oz wt/A. This treatment was also hand-weeded

<sup>X</sup>Means within a column followed by the same letter are not significantly different ( $p=0.05$ ) according to Fisher's protected LSD test.

YP values  $\leq 0.05$  indicate significant differences exist among treatments.

Table 2. Tomato injury and weed control at PSU-RS.

Herbicide <sup>1</sup>	Rate/A	Applic. method <sup>2</sup>	% Biomass Reduction (3 WAP) <sup>3</sup>	% Biomass Reduction (6 WAP)	Lg. crabgrass (3 WAP)	Redroot pigweed (3 WAP)	Eastern black nightshade (6 WAP)
Untreated check			0	0	0	0	0
Authority MTZ	6 oz wt	PPI	4 e	5 e	65 c	95 b	71 b
Authority MTZ	8 oz wt	PPI	9 de	8 de	89 b	99 a	92 a
Authority MTZ	10 oz wt	PPI	13 cde	17 cde	96 ab	99 a	94 a
Authority MTZ	12 oz wt	PPI	20 bcd	19 b-e	98 a	99 a	97 a
Authority MTZ	16 oz wt	PPI	33 ab	35 ab	97 ab	99 a	99 a
Authority MTZ	8 oz wt	PRE	23 abc	22 b-e	97 ab	99 a	99 a
Authority MTZ	12 oz wt	PRE	27 abc	28 abc	96 ab	99 a	99 a
Metribuzin fb	4.3 oz wt	PPI fb	37 a	42 a	99 a	99 a	99 a
Authority Elite	25 fl oz	PRE					
Authority Elite	25 fl oz	PRE	23 abc	25 a-d	99 a	99 a	99 a
P <sup>2</sup> >P <sup>3</sup>			0.0018	0.0068	0.0016	1.000	0.0001

<sup>1</sup>Authority MTZ = sulfentrazone + metribuzin; Authority Elite = sulfentrazone + s-metolachlor; Devrinol = napropamide. All plots received a POST treatment of Matrix (rimsulfuron) at 2 oz wt plus metribuzin at 3 oz wt/A plus nonionic surfactant  
<sup>2</sup>PPI (preplant incorporated) and PRE (preemergence) applications were made the same day.

<sup>X</sup>Means within a column followed by the same letter are not significantly different ( $p=0.05$ ) according to Fisher's protected LSD test.

YP values  $\leq 0.05$  indicate significant differences exist among treatments.

Table 3. Tomato yield and distribution of fruit maturity at UD-REC.

Herbicide	Rate/A	Applic. method <sup>2</sup>	Yield Ripe lbs/plot <sup>x</sup>	% Ripe Fruit	Yield Green lbs/plot	% Green Fruit
Untreated check			28.3 ab	73 a	3.8 e	10 f
Authority MTZ	6 oz wt	PPI	25.8 abc	69 abc	7.0 cde	17 cde
Authority MTZ	8 oz wt	PPI	28.7 a	72 ab	5.8 de	12 ef
Authority MTZ	10 oz wt	PPI	24.1 abc	63 a-d	6.1 de	14 def
Authority MTZ	12 oz wt	PPI	28.1 ab	62 bcd	8.5 a-d	17 cde
Authority MTZ	16 oz wt	PPI	19.3 c	53 de	9.5 abc	24 ab
Authority MTZ	8 oz wt	PRE	24.1 abc	58 cde	10.3 ab	23 abc
Authority MTZ	12 oz wt	PRE	21.3 bc	60 cd	8.5 a-d	23 abc
Metribuzin fb	2.9 oz wt	PPI fb	22.1 abc	62 bcd	7.1 bcd	20 bcd
Spartan Charge	3.7 fl oz	PRE				
Metribuzin fb	4.3 oz wt	PPI fb	19.3 c	49 e	11.7 a	28 a
Spartan Charge	5.5 fl oz	PRE				
Authority Elite	24 fl oz	PRE	22.8 abc	59 cde	9.9 abc	24 ab
Weed-free <sup>3</sup>			29.5 a	65 abc	6.1 de	13 ef
P <sup>2</sup> >P <sup>3</sup>			0.0480	0.0036	0.002	0.001

<sup>1</sup>Authority MTZ = sulfentrazone + metribuzin; Authority Elite = sulfentrazone + s-metolachlor; Spartan Charge = sulfentrazone + carfentrazone; Devrinol = napropamide. All plots received a POST treatment of Matrix (rimsulfuron) at 2 oz wt plus metribuzin at 3 oz wt/A plus nonionic surfactant

<sup>2</sup>PPI treatments and PRE applications were made the same day.

<sup>3</sup>PPI treatment of Devrinol at 2 qts/A + metribuzin at 3.5 oz wt/A. This treatment was also hand-weeded.

<sup>X</sup>Means within a column followed by the same letter are not significantly different ( $p=0.05$ ) according to Fisher's protected LSD test.

YP values  $\leq 0.05$  indicate significant differences exist among treatments.

Mr. Lingenfelter is with Penn State Univ. and Dr. VanGessel is with the Univ. of Delaware. This project was funded by the Pennsylvania Vegetable Marketing and Research Program and PVGA.

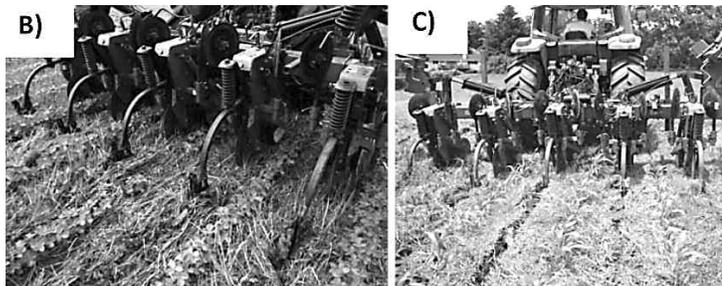
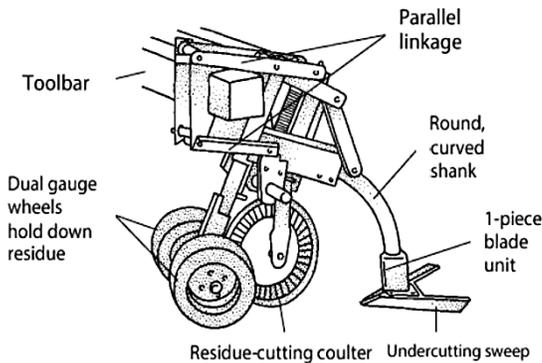
# Testing High Residue Cultivation for No-Till Snap Bean Production

Andrew Smith and Gladis Zinati

## Introduction

Conservation tillage practices and the use of cover crops promote soil quality in reduced tillage vegetable cropping systems. However, vegetable growers are facing challenges with weed control during the growing season. In no-till vegetable systems, surface residues of cover crops that were either killed with herbicide or mechanical methods provide weed suppression for about four to five weeks. After this time, there are few chemical options and mechanical cultivation is difficult if cover crop residues are left on the soil surface. Therefore, the growth and yield of vegetable crops such as snap beans and winter squash may be impacted by spring weeds that grow at a faster rate than the cash crop or summer weeds that emerge after planting. The high residue cultivator (HRC) (Figure 1) has been developed to mechanically control weeds in no-till grain systems that include cover crops terminated with herbicides or the roller-crimper tool (Figure 2). The cover crop residue makes normal cultivation difficult or impossible but the HRC has sweeps that pass under the residue and undercut weeds in the first inch of soil. It has been a successful tool in corn (*Zea mays*) and soybean (*Glycine max*) grain production but is rarely used for vegetables.

Figure 1. High Residue Cultivators. A) High residue cultivator schematic (from North Carolina State University), B) in organic soybean production, and C) in conventional no-till corn production.



In 2018, a field trial was conducted within the Rodale Institute Vegetable Systems Trial (VST) that compared weed control in organic and conventional no-till snap bean (*Phaseolus vulgaris*) production. The VST, which began in 2017, is a long-term, side-by-side comparison of different vegetable management systems that include reduced till and plasticulture systems under organic and conventional management. Weed populations will be continuously monitored within these systems over time. Funding by the Pennsylvania Vegetable Growers Association and Pennsylvania Vegetable Marketing board were used to take weed and yield measurements in 2018.

The specific objective of this project was to measure differences in weed densities, weed communities, and yield of snap beans grown in a no-till system under organic or conventional management.

## Materials and Methods

The field layout was a randomized complete block design with 4 replicates of organic no-till snap beans and 4 replicates of conventional no-till snap beans.

**Cover crop establishment:** Snap beans follow butternut squash (*Curcubita moschata*) in a rotation and cover crops were established on September 12th, 2017 following squash harvest. The organic plots were tilled with a chisel plow, disked and packed, and planted with cereal rye (*Secale cereale*) (VNS) at a rate of 3 bushels (168 lbs.) per acre. Conventional plots were sprayed with 685 ml (24 oz.) Bullzeye® (Glyphosate) per acre using with a field sprayer and 1.78 bushels (100 lbs.) of cereal rye was planted one week later using a no-till grain drill.

**Cover crop biomass measurements:** One day prior to cover crop termination, all aboveground plant biomass is removed from a 1-m<sup>2</sup> quadrat and weighed wet and dry.

**Cover crop termination:** On May 14th, conventional plots were sprayed with 395 ml (13.4 oz.) Bullzeye® (Glyphosate) tank mixed with 354 ml (12 oz.) Dual II Magnum (S-Metolachlor) and 842 g (1.86 lbs.) ammonium sulfate per acre. On June 6th snap beans (Provider) were planted with a (continued on page 22)

**Improve the planting, maintenance and harvesting of your produce!**

**ROHAND II**  
A solar-charged, battery-powered cart for hours of operation.

**FISHER'S SPRAYER MFG LLC**

25 Old Leacock Rd  
Ronks PA 17572  
717-768-7619

Proveyorwagon.com

**Proveyor Wagon**  
Hydraulic conveyor harvester

## VEGETABLE PRODUCTION

**Testing High Residue...** (continued from page 21)

Figure 2. Roller-Crimper. A) Roller-crimper front mounted with a Monosem NG+ no-till planter mounted behind the tractor. B) Rolling down cereal rye and planting snap bean in one pass. The dust cloud just above the roller-crimper is rye pollen. C) Close-up view of roller-crimper and chevron pattern that allows the roller-crimper to maintain contact with cover crop residue at all times and not bounce or skip. D) Field after one-pass rollcrimp and planting. (photos: Rodale Institute)

Monosem NG+ no-till field planter in 30-inch rows. An IJ Manufacturing (Gap, PA) 10-foot roller-crimper was front mounted to the tractor to roll and crimp the rye cover crop while planting. In the organic system it is required that the cereal rye reach pollen shed (anthesis) prior to rolling-crimping in order to achieve effective cover crop kill and residue to provide a weed barrier. Two days after planting on June 8th, an additional application of 685 ml (24 oz.) Bullzeye® (Glyphosate) per acre was applied to the conventional plots. High residue cultivation: The high residue cultivator was used in the organic plots only approximately thirty days after planting on July 2nd.

**Weed measurements:** Weed measurements were taken on July 12th when plants began flowering. Weed measurements within a 1-m<sup>2</sup> quadrat were taken in three random locations in each research plot. All weeds within the quadrat were removed, counted, identified, and total weights measured wet and dry.

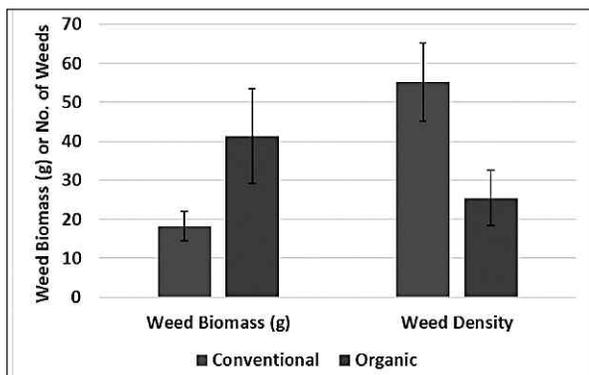


Figure 3. Weed measurements in snap bean production in the Vegetable Systems Trial, Kutztown, PA – 2018. Columns ( $\pm$ SEM) are average dry weed biomass or total number of weeds counted in three 1-m<sup>2</sup> quadrats (4 replicates) in snap bean plots under conventional or organic management.

**Yield measurements:** Once pods reached marketable size beans were harvested two times per week for five harvest dates. All potentially marketable beans were harvested from two twenty-foot row sections in the middle two rows (8 rows total). Yields were also taken in 10-foot row weed-free plots in each plot. These plots were hand weeded weekly starting 14 days after planting and prior to first harvest. All beans were brought back to the lab and sorted into marketable and cull beans. Culls were mainly those that were misshapen or had spots indicating disease.

**Results**

**Cover crop biomass:** The rye cover crop biomass was 2,850 kg per hectare and 4,300 kg per hectare in the conventional and organic plots, respectively. The difference between the management systems was not unexpected since the conventional plots were sprayed with herbicides three weeks prior to cover crop termination with the roller-crimper in the organic plots. Cover crop biomass in the organic treatment is sufficient for adequate weed control but studies with soybeans indicate that as cover crop biomass increases, weed control and yields are improved with a target minimum biomass of 5,000 kg per hectare. The conventional system is relying on herbicides and not cover crop biomass for weed control.

**Weed measurements:** Weed biomass (grams dry weight per 1-m<sup>2</sup>) was higher in the organic treatment but weed density (Number of weeds per 1-m<sup>2</sup>) was higher in the conventional treatment (Figure 3). Weeds in the conventional plots emerged later in the growing season due to herbicide applications that included a contact (Glyphosate) and a pre-emergence (Dual II Magnum) herbicide and therefore there were more weeds that were smaller. The weeds in the organic treatment likely emerged early and those that were able to break through the cover crop barrier were larger by time of weed measurement. The weed communities were different between the treatments with ragweed, hairy galinsoga, foxtail and pigweed higher in conventional plots and thistle, dock, nightshade, and bindweed higher in organic plots. Future management strategies may include a targeted approach for problem weeds. Weed management needs to be improved in both systems. In the organic system, strategies should include methods to increase cover crop biomass. In the conventional system, increasing herbicide rates may be necessary for improved weed management. Future research trials will explore these possibilities.

**Yield:** Yields were higher in the conventional management system (Figure 4). In the conventional system, yields in the weed free sub-plots were 20% higher than the sub-plots under standard management. In the organic system, yields in the weed free subplots were 111% higher than the sub-plots under standard management. It therefore appears that weeds limited yields in the organic system to a greater extent than in the conventional system. However, in the absence of weeds it would be expected that yields between the conventional and organic systems would be comparable. Cereal rye is known to have allelopathic or growth limiting effects on plants grown near rye. This has not been observed for soybean (*Glycine max*) but we sus-

(continued on page 23)

## VEGETABLE PRODUCTION

**Testing High Residue...** (continued from page 22)

pect it could be what is causing the severe difference in yields between conventional and organic snap beans in this trial. Investigations will be conducted in 2019 to compare snap bean production in rye, triticale, and bare ground to determine if allelopathy may be stunting snap bean growth and production. Previous studies have also found a benefit of heavy rye residue during periods of drought but 2018 was an extremely wet year and soil moisture was not a limiting factor on plant growth.

The relationship between weed biomass or weed density and yields was modeled and show that incremental increases in weed pressure in the conventional system results in reduced yields while yields are not substantially reduced as weed pressure increases in the organic system. This is consistent with previous work conducted on corn and soybeans<sup>1, 2</sup> and suggests that factors other than weeds may be more limiting to snap bean yields in organic systems. This model will be improved by adding yield and weed free data from 2017 and future years in to a hyperbolic model that has been used previously by weed scientists<sup>1, 2</sup> to determine yield-weed relationships. Also, weed seed bank measurements are taken every three years and will also be used to determine yield limitations due to weeds in organic and conventional vegetable systems<sup>3, 4</sup>.

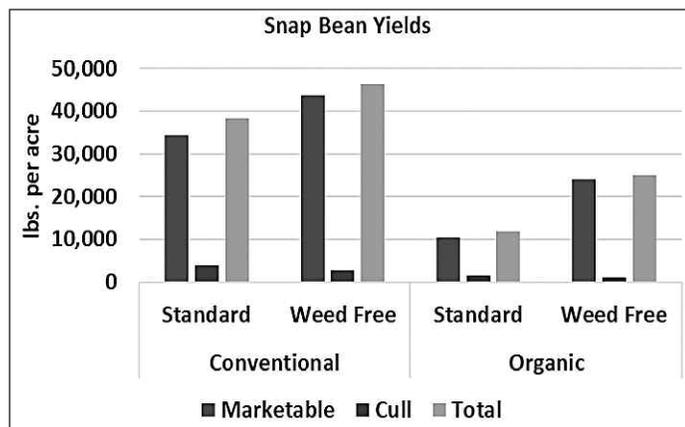


Figure 4. Snap bean yields organic and conventional no-till production systems, Vegetable Systems Trial, Kutztown, PA – 2018. Columns are the sum weights of marketable, cull, and total snap beans harvest five times over three weeks.

**Outreach**

This project was showcased during the Rodale Institute's field day in July 2018. Over 400 visitors attended the field day and the VST station included citizen science soil measurements in the organic and conventional snap bean fields. Comprehensive soil health measurements are taken annually in all VST plots that include chemical, physical, and biological measurements. For the field day demonstration penetrometer readings were taken in ten in-row locations in an organic and conventional plot. This was repeated four times with different groups of visitors and each time the depth to sub-surface compaction was shallower in the conventional plot meaning more compaction and a restricted plant rooting depth. The conventional plot had not been tilled for more than 2 years while the organic plot was tilled twice over that time period to establish cover crops. While this was a non-scientific study it suggests

that tillage may play a beneficial role of breaking up compaction and that multiple soil health indicators are needed to determine overall soil health. The results of this report will be posted as a fact sheet on the Rodale Institute website. This will be made available as a link from the Pennsylvania Vegetable Grower Associate website or as print article in the Pennsylvania Vegetable Growers Quarterly Newsletter.

**Discussion**

Weed management is a major concern for vegetable producers. Control of weeds can be a limiting factor in growers deciding to adopt no-till or organic practices. Crop residue left on the soil surface makes it difficult to control weeds during the season without cultivating and organic growers do not have herbicides as tool for weed management. The high residue cultivator could be a viable tool for conventional and organic growers to have additional weed control mid-season in snap beans and other vegetable crops. This study was part of a systems trial that compares differences between organic and conventional management and therefore the high residue cultivator was not tested in the conventional system. Future studies will test the high residue cultivator in organic and conventional plots and take weed measurements before and after cultivation and yield measurements with and without cultivation. The growth of the organic snap beans appeared stunted in 2017 and 2018. Both years were atypically cool, wet years and the heavy rye cover crop residue in the organic system may have kept soils cool and restricted plant growth. However, in both years, there were small, round blemishes on the first and second true leaves that appeared like the symptoms of rust. However, these symptoms were never noticed on the conventional plants and future growth did not show these symptoms. Also, the leaves in the organic plots were a pale green suggesting nitrogen deficiency, yet the seeds were inoculated with *Rhizobium* spp. for nitrogen fixation. For these reasons, we suspect that rye may be stunting the growth of the snap bean plants in the organic system. Future investigations will be conducted to determine if cereal rye is in fact reducing snap bean growth and yield.

**Literature Cited**

1. Ryan M, Mortensen D, Bastiaans L, et al. Elucidating the apparent maize tolerance to weed competition in long term organically managed systems. *Weed Research*. 2010; 50: 25-36.
2. Ryan M, Smith R, Mortensen D, et al. Weed-crop competition relationships differ between organic and conventional cropping systems. *Weed Research*. 2009; 49: 572-80.
3. Buhler DD, Hartzler RG and Forcella F. Implications of weed seedbank dynamics to weed management. *Weed Science*. 1997: 329-36.
4. Forcella F. Prediction of weed seedling densities from buried seed reserves. *Weed Research*. 1992; 32: 29-38.

*Dr. Smith and Dr. Zinati are with the Rodale Institute. This project was funded by the Pennsylvania Vegetable Marketing and Research Program and PVGA.*

## VEGETABLE PRODUCTION

## 2018 Onion Variety Trial

Thomas Butzler and Michael Orzolek

Date seeded: February 12, 2018

Date transplanted in field: May 7, 2018

Population: 40 plants per plot (unless noted)

Production system: raised beds covered with black plastic mulch with 2 drip irrigation tapes placed 1.5 inches deep in bed. Four row/bed 5.0 feet long with 6x6 inch spacing, 40 plants/rep

Design: Randomized Complete Block with 3 replications

Herbicide Application: Medal at 1.5 pts/acre broadcast prior to transplanting onions.

Fertility: April 26, 2018, broadcast and incorporated 500 lbs/A of 19-19-19 and incorporated in the soil prior to laying beds and transplanting the onions.

Harvested:

September 8, 2018 (Scout, Candy, Cabernet)

September 15, 2018 (Rhino, Rossi Di Milano)

September 20, 2018 (Red Hawk, Red Mt., Yukon, Yosemite, Monastrell)

September 24, 2018 (Aruba, Great Western, Dulce Reina, Saffron, Sedona, Mondella, Cherry Mountain, Red Carpet, Diamond Swan, Lyrica, White Opera, LA50)

Drying: Bulbs from individual plots were placed in 100 lb. potato Burlap bags and placed on benches, after harvest, in a 30' x 96' high tunnel covered with 2 layers of row cover. Approximately 40 bulbs of each variety were placed in a wooden slatted box in 55 F storage

Graded: October 26, 2018 on a TEW Grader. Approximately 40 bulbs of each variety were placed in a wooden slatted box in 55 F storage before shipping for testing of soluble solids and pungency.

Samples processed for pungency and sugars: November 1, 2018

### Results

Eighteen onion varieties (Table 1) were seeded on 12 February in 200 plug seed trays with soilless media. Transplants were cut and maintained on 14 March and 23 April at a 4-inch height in the greenhouse prior to transplanting in the field. Five hundred pounds of 19-19-19 per acre was incorporated into the soil prior to laying beds and transplanting the onions. Medal was applied at 1.5 pts/acre on May 3, 2018 for early weed control. Hand-pulling/hoeing of weeds was used the rest of the growing season. Growing conditions in 2018 were not ideal. While temperatures were average for the growing season, the area around the Horticulture Research Farm, Rock Springs set a summer rainfall record (previous record set in 2003). These weather conditions may have adversely affected yield and bulb size when compared to previous years.

The Pennsylvania standard yellow onion variety, Candy, yielded 15.38 tons per acre (Table 2) which was the highest not only among the yellows but throughout the whole trial. Scout, Aruba, and Yukon were the next highest yielding yellows at 13.43T/A, 12.4T/A, and 12.30 T/A respectively. Average bulb size for yellow varieties was highest with Yukon at 13.8 ounces (oz), followed by Mondella (13.1 oz.) and Aruba (13.0 oz.). Yukon's average bulb size was the highest for all varieties in the trial. For large bulbs, Mondella was the highest with 68 percent of bulbs greater than 3 inches in diameter.

Seven reds were trialed and the highest marketable yielding red was Red Hawk at 13.4 T/A followed by Red Mountain

Table 1. Onion Varieties evaluated in 2018.

Variety	Source	Bulb Color
Aruba	Sakata	Yellow
Yosemite	Sakata	Yellow
Saffron	DePalmer Seeds	Yellow
Rhino	Hazera Seed	Yellow
Mondella	Seedway	Yellow
Scout	Johnny's	Yellow
Candy	Field grown transplants	Yellow
Yukon	Sakata	Yellow
Cherry Mountain	DePalmer Seeds	Red
Cabernet	Johnny's	Red
Monastrell	Johnny's	Red
Rossa di Milano	Johnny's	Red
Red Hawk	Bejo	Red
Red Mountain	Bejo	Red
Red Carpet	Johnny's	Red
Diamond Swan	DePalmer Seeds	white
Lyrica	Tozer	white
White Opera	Tozer	white

Table 2. The marketable yield of eighteen Spanish onion varieties evaluated at the Horticulture Research Farm, Rock Springs, PA – 2018

Variety	Total MKT (Yield T/A) <sup>x</sup>	Avg. bulb (wt. – oz) <sup>y</sup>	% Large <sup>z</sup>
Aruba	12.5	13.0	64
Yosemite	10.0	12.2	54
Saffron	10.6	10.7	37
Rhino	8.9	10.9	32
Mondella	10.6	13.1	68
Scout	13.4	12.6	53
Candy	15.4	12.2	59
Yukon	12.3	13.7	61
Cherry Mountain	11.3	9.9	33
Cabernet	6.3	6.4	1
Monastrell	8.5	9.6	26
Rossa di Milano	9.0	9.0	23
Red Hawk	13.4	11.4	55
Red Mountain	11.5	10.1	37
Red Carpet	10.6	10.7	49
Diamond Swan	8.5	11.3	43
Lyrica	13.0	12.2	51
White Opera	11.6	11.6	49

X - The total marketable yield included all bulbs greater than 2.5 inches in diameter and is based on an onion population of 50,000 plants/A.

Y - The average bulb weight in ounces included all bulbs greater than 2.5 inches in diameter

Z - The percent large bulbs included all onion bulbs greater than 3.0 inches in diameter.

and Cherry Mountain at 11.5 T/A and 11.3 T/A respectively. Red Hawk also had the highest average bulb size at 11.4 oz with Red Mountain (10.1 oz.) and Red Carpet (10.7 oz.) the next highest. For large bulbs, Red Hawk was the highest with 55 percent of bulbs greater than 3 inches in diameter.

(continued on page 25)

# Pollenizer Systems and Spacing for Seedless Watermelon Revisited

Gordon Johnson

There are four pollenizer systems that have been successful for seedless watermelons. The original research with seedless production showed that for standard size seedless watermelons a 1:3 ratio of pollenizers to seedless maximized yields and field space. A 1:2 ratio did not increase yield. A 1:4 ratio gave similar results often to a 1:3 ratio. However, if there were any pollenizer losses, the reduction in pollen production had a much greater yield effect. For example, a 20% pollenizer loss in a 1:3 ratio results in a final ratio of about 1:3.8; in contrast, a 20% pollenizer loss in a 1:4 ratio results in a final ratio of 1:5 which can be pollen limiting.

Pollenizers can be planted in several configurations:

1. Pollenizers are planted in separate rows between seedless rows
2. Pollenizers are planted every fourth plant in the seedless row at even spacings
3. Evenly spaced seedless plants with the pollenizer placed between every third and fourth seedless plant in-row
4. Every third plant is co-planted with seedless and pollenizer in the tray and then planted in-row

Research has shown that the in-row pollenizer planting method (3) and the co-planted pollenizer method (4) have the highest yield potential per area planted.

One issue with in-row pollenizer planting is the need to have a separate pollenizer planting operation at the same time the seedless is being planted. This has led to problems with mixing up pollenizers and seedless plants by planting crews. One way that this can be avoided is by spraying a white particle film clay product on the pollenizers to "color code" them so that crews can tell them apart from the seedless. Research at UD has shown that this coating has no effect on pollenizer performance as new leaves that are produced are normal green in color.

Another way that this issue has been addressed is to switch to co-planted pollenizers. In this program, every third plant double planted with a seedless and a pollenizer plant. The planting crew then pulls plants in order from the tray and the correct ratio (1:3) of pollenizer to seedless is planted without needing a separate planting operation. This eliminates the need for separate planting trays of pollenizers to keep track of and reduces by ¼ the number of trays to be carried in the field.

With seedless spacing, research has shown that with standard seedless types (36-60 count seedless), a 3-foot spacing between plants give the best yield and economy (plants used). Closer spacing had the potential for higher yield but did not justify the higher plant cost while wider spacing (4 ft. between plants or greater) sometimes reduced yield or increased hollow heart.

In mini-watermelons (under 8 lbs), the standard recommendation has been to plant at a 2 ft spacing between plants. However, other research has shown that yield and size grades were optimized at a 1 ft in-row spacing.

Research on pollenizers for seedless watermelon production in several production regions including Delmarva, Georgia, and Indiana have shown some interesting results. The bottom line is that pollenizer selection can be as important for overall yield, fruit quality, and early crown set as the triploid seedless variety selected.

Research at the University of Delaware and the University

of Georgia showed that early flowering differed with pollenizers and seedless varieties and that some combinations were better matched than others.

An interesting point to consider is that currently, no one pollenizer is perfect for achieving high early sets, high later sets, reduced hollow heart, and total over all yields. In addition, some standard seeded and special pollenizers are better suited for in-row use than others.

The following are some points on how to get achieve the best results for seedless watermelon production with pollenizer choice:

- ⊂ For in-row and co-planted systems, choose only those pollenizers that provide good male flower production but that are not overly competitive. Most special pollenizers work well, but fewer standard seeded types are adapted to these uses (Stargazer, MickyLee, hybrid icebox types). In contrast, the more vigorous seeded types are well suited for separate bed systems (such as Sangria, Estrella).
- ⊂ Advances have been made with special pollenizer breeding and newer generation pollenizers have better disease packages and more extended flowering. If one pollenizer is being used, consider these new varieties (SP-7 from Syngenta or Wild Card Plus from Sakata as examples).
- ⊂ Consider using two pollenizers in a field. Choose a good early flowering type for effective early yield and long flowering type for sustained yield. Field surveys have shown good results where this type of combination has been used.

In fields where diseases are a concern such as second year fields, or those that have had shorter rotations, use only pollenizers with good disease resistance packages. For example, research in Indiana has shown that some pollenizers are much more susceptible to anthracnose and Fusarium wilt than others.

*Dr. Gordon is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Coop. Extension, Vol. 27, Issue 3, April 12, 2019.*

## 2018 Onion... (continued from page 24)

Three whites were evaluated and Lyrica was the highest yielding white variety at 13.0 T/A followed by White Opera at 11.5 T/A. Lyrica also produced the highest average bulb size at 12.3 oz. For large bulbs, Lyrica was the highest with 51 percent of bulbs greater than 3 inches in diameter.

Culls were very low with Red Mountain, Diamond Swan, and White Opera having the highest amount (Table 3). The pungency ratings for all the onion varieties fell into the very mild sweet onion level (1-4 micromoles of pyretic acid (Table 3). Five of the seven red varieties had the highest soluble solid levels in the trial (Red Carpet, Red Mountain, Rossi do Milano, Cherry Mountain, and Red Hawk). The highest soluble solids for the yellow and white varieties were Mondella and White Opera respectively. Sweet onions should be high in soluble solids and low in pyruvic acid.

*Mr. Butzler is with Penn State Extension and Dr. Orzolek is retired from Penn State Univ. This research was funded by PVGA and the Pennsylvania Vegetable Marketing and Research Program.*

## VEGETABLE PRODUCTION

## The Secret Lives of Weeds

Susan B. Scheufele

It helps when trying to figure out how to manage weeds better to understand why they are so darn successful in the first place. Weeds are plants that thrive in disturbed environments, like annual vegetable systems that are repeatedly tilled. But all weeds are not created equal, and each species has its own lifestyle—when and why it germinates, where it thrives, and so on—which you can use to your advantage when it comes to managing them. Here we have broken them down into the following groups: summer annuals (small- or large-seeded broadleaves, and grasses), winter annuals, biennials, and perennials (stationary or wandering). Get to know your most problematic weeds and determine when and how you can get the most out of your weed control efforts. It will also help to have a good field guide around to help identify weeds in the field, we recommend “Weeds of the Northeast” by Uva, Neal and DiTomaso. At the end of the article you will find some other resources to peruse, good luck!

### Annual Weeds

Annual weeds germinate from seeds and complete their life-cycles within one year, while perennial weeds survive from year to year through underground storage structures from which they re-grow.

Summer annuals germinate in spring and set seed during the growing season—some may have multiple generations per season. Many of our most common and troublesome vegetable weeds fall into this category, including crabgrasses, foxtails, pigweeds, lambsquarters, hairy galinsoga, velvetleaf and purslane, for a few. Since the summer annuals are such a big and diverse group, it is helpful to further break them down:

Small-seeded broadleaf weeds germinate when seeds are within the top one inch of soil. They grow very quickly and produce a huge amount of seeds (tens to hundreds of thousands), to improve the chances that some individuals will survive in a highly disturbed area. Because the seeds are small, seedlings of these species are very small and fragile, so it is important to take advantage of this vulnerability and control them at this stage.

Examples: Pigweeds (*Amaranthus spp.*), lambsquarters (*Chenopodium album*), galinsoga (*Galinsoga ciliata*), smartweeds (*Polygonum spp.*), purslane (*Portulaca oleracea*)

Control Strategies:

- Cultivate the top 1-2 inches of soil 2 to 4 times within the first month following tillage to eliminate most individuals that will emerge during the season
- Organic mulches are also highly effective—reduce weed density by hoeing or shallow cultivation before placing the mulch
- Plant crops densely if the crop will tolerate it, since these weeds are easily shaded-out
- Flaming may be effective on plants < ¼ - ½ inch tall
- Cultivating in the evening can reduce emergence of seeds brought to the surface by tillage
- Remove escapes before they set seeds since they produce so many long-lived seeds

Large-seeded broadleaf weeds emerge from seeds buried between 0.5 and 2 inches deep in the soil. They grow rapidly and are more competitive than small-seeded annuals, since they have more energy stored up, have bigger leaves, and are more competitive with your crops. They produce fewer seeds (hundreds to thousands per plant) but seeds can survive for longer periods of time (decades).

Examples: Velvetleaf (*Abutilon theophrasti*), giant ragweed

(*Ambrosia trifida*), common cocklebur (*Xanthium strumarium*), morning glories (*Ipomea spp.*)

Control Strategies:

- Delay planting until early-June to allow most seeds to germinate and be killed in preparing seedbed (velvetleaf)
  - Repeated cultivation in the early season to prevent establishment.
  - Mulches are NOT effective because more energy is stored in large seed and emerging plant is bigger and stronger
  - Don't allow to go to seed, as the seeds last longer in soil
- Summer annual grasses emerge mostly from the top ½-1 inch of soil. They produce a huge amount of seed and seeds are very long-lived. Summer annual grasses are associated with shallow or reduced tillage practices or compacted soils.

Examples: Foxtails (*Setaria spp.*), Crabgrasses (*Digitaria spp.*), Barnyardgrass (*Echinochloa crus-galli*), Fall panicum (*Panicum dichotomiflorum*)

Control Strategies:

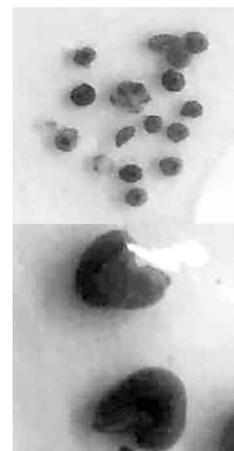
- Use transplants, plant into clean beds—Vigorously growing crops can outcompete relatively shade-intolerant grasses
- Use stale-seedbed for small-seeded crops or those with a wimpy canopy like carrots
- Cultivate before plants exceed ¼ inch
- Pay attention to ends of rows, between rows, or edges of plastic where there is no competition from crops and/or the soil is compacted

Winter annuals, in contrast, germinate in late summer or fall and overwinter as small plants or rosettes, resume growth in spring, and set seed late spring or summer. These weeds are most problematic in winter (think chickweed in overwintered greens!) or in early spring crops and in no-till systems.

Examples: Wild mustard (*Brassica kaber/Sinapsis arvensis*), horseweed (*Conyza canadensis*), shepherd's purse, field pepperweed (*Lepidium campestre*), henbit (*Lamium amplexicaule*), and purple deadnettle (*Lamium purpureum*).

Control Strategies:

- Fall tillage for spring planted crops is effective, or till in spring and delay planting
- Rotation with warm season crops like squash and tomato tends to break the life cycle of these cool season weeds
- Organic mulches are very effective since winter annuals occur as small, prostrate plants or rosettes over the winter
- Use up all applied nitrogen by end of season, as these can be effective N scavengers



### Biennial Weeds

Biennial weeds are propagated from seeds but generally take more than one full year to complete their life cycles. They grow vegetatively during the first growing season, overwinter as a root, then bolt and flower during the second season. They are very similar to winter annuals, but they can start growing ear-

*Seeds of lambsquarters on the left and velvetleaf on the right, illustrating the difference between small and large-seeded annuals.*

(continued on page 27)



## VEGETABLE PRODUCTION

### **The Secret Lives...** (continued from page 26)

lier in the season of their first year so that they may live longer than one full calendar year. They are also similar to stationary perennials since they survive as a taproot.

Examples: Wild carrot (*Daucus carota*), wild parsnip (*Pastinaca sativa*), common burdock (*Arctium minus*), bull thistle (*Cirsium vulgare*), common teasel (*Dipsacus fullonum*), white campion (*Silene alba*)

Control Strategies:

- Fall tillage for spring planted crops is effective, or till in spring and delay planting
- Organic mulches are very effective since biennials start as small, prostrate plants or rosettes over the winter
- Frequent mowing or cutting is effective, taking care not to allow flower heads to form
- Tillage is usually very effective, but if the crown is cut up then new plants may be produced

### **Perennial Weeds**

Perennial weeds survive for multiple years from underground structures, and can be stationary or wandering.

Stationary perennials are slow growing at first but later become very competitive. They reproduce by seeds, which they produce each year, and individuals survive for several years. These plants overwinter as large taproots in the case of broadleaf weeds like chicory, or large clumps of fibrous roots as in grasses like tall fescue. When the aboveground plant parts are killed through mowing, cultivation, or frost, the plant later regrows from these underground reserves.

Examples: Curly and broadleaf docks (*Rumex crispus* and *R. obtusifolius*), chicory (*Cichorium intybus*), dandelion (*Taraxacum officinale*)

Control Strategies:

- Cultivation and tillage can be effective at exhausting storage roots and will not spread the weed as with wandering, or creeping, perennials
- Mowing down foliage will also exhaust storage organs
- Removing taproots or crowns from the field is highly effective if scale-appropriate

Wandering perennials reproduce by seed but also by underground vegetative structures like rhizomes (root-like stems), stolons (creeping stems like strawberry runners), or tubers. Fragments of stolons or rhizomes can generate new individuals

Examples: Johnsongrass (*Sorghum halapense*), quack grass (*Elytrigia repens*), yellow nutsedge (*Cyperus esculentus*), horsenettle (*Solanum carolinense*), milkweed (*Asclepias syriaca*), bindweeds (various), and Canada thistle (*Cirsium arvense*).

Control Strategies:

- Organic and synthetic mulches are NOT effective since the plants have so much stored energy and can poke up through thick mulch
- Persistent removal of the shoots (mowing or hoeing) before they attain several leaves will exhaust the storage roots within two years—this effort should be focused in the spring when storage reserves are at their lowest
- Deep tillage (e.g., to 1 foot, or 30 cm) will chop up and thereby weaken the storage roots
- Watch for creeping perennials moving into fields from hedges and fences

### **Resources**

UMass Weed Herbarium Online: <https://extension.umass.edu/landscape/weed-herbarium>

New England Pest ID Guide, includes weeds as well as insects and diseases: [http://nevegetable.org/sites/nevegetable.org/files/Pest\\_ID\\_2016.pdf](http://nevegetable.org/sites/nevegetable.org/files/Pest_ID_2016.pdf)

Ecological Weed Management at Cornell: <https://weedecology.css.cornell.edu/manage/>

Michigan's Worst Weeds, helpful descriptions of several tough weeds: <http://www.msuweeds.com/worst-weeds/>

*Ms. Scheufele is with the Univ. of Massachusetts Extension.*

*From **Vegetable Notes for Vegetable Farmers in Massachusetts**, Univ. of Mass. Ext. Vol. 29, No. 3, March 9, 2017.*

## Spring Cover Crops for Vegetable Rotations

Gordon Johnson

One principle of managing soil for improved health is to always have a crop growing on the soil. This will maintain or add organic matter, provide benefits from the action of growing roots, and recycle nutrients.

Where fall cover crops were not planted due to late harvest, spring cover crops can be planted in early April to provide soil health benefits where vegetables and field crops are not scheduled until late May or the month of June.

The most common cover crop options for late March or early April planting include spring oats, mustards and annual ryegrass. Plant oats at 90-120 lbs per acre, mustards at 10-20 lbs per acre, and annual ryegrass at 20-30 lbs per acre.

Field peas are another option; however, we are somewhat south of the best zone for spring planting. One type of field pea is the winter pea which is often fall planted in our area but can be spring planted. It has smaller seed so the seeding rate is 30-60 lbs per acre. Canadian or spring field peas are larger seeded and used as a spring cover crop planted alone at 120-140 lb/A.

Mixtures can also be used. Field peas are well adapted to mixing with spring oats or with annual ryegrass. Reduce seeding rates of each component when using in mixtures. Recommended seeding rates are 70 lbs of oats per acre and 40 lbs/A of Austrian winter peas or 80 lbs/A of Canadian or spring field peas.

Many mustard family crops have biofumigation potential. When allowed to grow to early flower stage and then incorporated into the soil, they release compounds that act as natural fumigants, reducing soil borne disease organisms. Some biofumigant mustard varieties and blends include 'Pacific Gold', 'Idagold', 'Caliente', 'Trifecta', and 'Kodiak'. Other mustard family crops serve as non-hosts, trap crops, or deterrents for pests. In research at the University of Delaware biofumigation using early spring planted biofumigant crops such as 'Image' radish, 'Dwarf Essex' rapeseed, or 'Nemat' arugula showed potential for managing root knot nematode populations. When used as a biofumigant, mustard family cover crops should be grown to achieve maximum biomass by adding 60-100 lbs of nitrogen per acre. Nitrogen is also required to produce high biomass with spring oats and annual ryegrass at similar rates. When planting mixtures with peas, nitrogen rates should be reduced.

An often-forgotten spring seeded legume crop that can also be used is red clover. Red clover can be frost seeded into small grains, seeded alone, or mixed with spring oats or annual ryegrass. Seeding rates for pure stands would be 10-16 lbs/A, for mixtures 6-10 lbs/A.

*Dr. Gordon is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Coop. Extension, Vol. 27, Issue 2, April 5, 2019.*

## POTATO PRODUCTION

## Calcium and Potato Tuber Development

Gordon Johnson

Several disorders of potatoes are associated with localized calcium deficiencies in the tubers. This includes internal rust spot, internal browning, heat necrosis, hollow heart, and bruising. Calcium is a component of plant cell walls and the pectin in the middle lamella that cements cells together. Local deficiencies of calcium during the development of potato tubers can cause collapse of cells leading to these disorders.

In plants, calcium moves from the soil exchange sites into soil water and to plant roots by diffusion and mass flow. At plant roots, the calcium moves into the xylem (water conducting vessels), mostly from the area right behind root tips. In the xylem, calcium moves with the transpirational flow, the movement of water from roots, up the xylem, and out the leaves through stomata. Calcium is taken up by the plant as a divalent cation, which means it has a charge of +2. It is attracted to negatively charged areas on the wall of the xylem, and for calcium to move, it must be exchanged off the xylem wall by other positively charged cations such as magnesium ( $Mg^{++}$ ), potassium ( $K^+$ ), ammonium ( $NH_4^+$ ), or other calcium cations ( $Ca^{++}$ ). This cation exchange of calcium in the xylem requires continuous movement of water into and up through the plant. It also requires a continuous supply of calcium from the soil. The main sink for calcium is developing shoot tips.

In potatoes, tubers develop below ground on the tips of underground plant stems called stolons. Because calcium movement in the plant is driven by transpiration there is limited movement of calcium through root uptake to the developing tubers. It is therefore necessary to have adequate available (exchangeable) calcium around stolons as tubers are formed and adequate moisture to maintain calcium levels in the soil water. To get the full benefit, calcium needs to be in the zone of tuber development and moisture needs to be maintained at optimal levels critically during early tuber development (cell division) and then through the growing season. To have adequate calcium it is important to apply lime to bring the pH to acceptable levels; however, this often is not sufficient for potatoes. One reason is because of the need in scab susceptible varieties to keep soil pH below 5.4 to control this soil-borne disease.

To deal with this issue, additional calcium is often added in the form of gypsum (calcium sulfate) at the rate of 500-1500 lbs per acre. Gypsum supplies calcium without changing the soil pH. An application of 900 lbs of gypsum will supply approximately 200 lbs calcium/A. Foliar applications of calcium and sidedress applications of calcium nitrate (at rates commonly applied on Delmarva) do little to provide adequate calcium to prevent disorders. Gypsum can be applied pre-plant or during hilling. Calcium needs to be in the tuber development zone during the cell division stage. Once tubers reach ¼ inches in diameter there is very little new cell formation. For Ca to be able to get in the tuber it needs to be available between the hook and initiation stages (see figure).

Dr. Gordon is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the **Weekly Crop Update**, Univ. of Delaware Coop. Extension, Vol. 27, Issue 5, April 26, 2019.



Photo showing hook and tuber initiation stages in potatoes.

## Seed Potato Considerations

Folks are beginning to start thinking about planting potatoes, pulling seed from storage. Seed should be stored at 38°F to 40°F with relative humidity maintained at 95%. Seven to 14 days prior to cutting or planting, tubers should be warmed gradually to 50°F to 55°F. Good ventilation and 90% relative humidity should be maintained during this process. Cut seed pieces should be blocky, have at least one eye, and weigh 1.5 to 2 oz.

Seed should be inspected before planting to ensure a quality crop. Only certified or foundation seed should be planted, because it has met specific conditions for production practices and disease tolerances. One new disease of concern which can be seed-borne is the bacterial disease known as *Dickeya*. This blackleg-like disease is caused by the bacterium, *Dickeya dianthicola*, an aggressive pathogen that has the potential to cause more severe losses than species of *Pectobacterium* (aka *Erwinia*) that cause typical blackleg symptoms. Other seed-borne diseases include Potato virus Y, ring rot (caused by a bacterium), and Fusarium dry rot (caused by a fungus). If you suspect your seed is contaminated with a disease, you should consider submitting samples to the UMass Diagnostic Lab. So far this year in Massachusetts, Fusarium dry rot and *Pectobacterium* were diagnosed on seed potato from a distributor in Wisconsin; *Dickeya* was not present in this sample. Tubers with Fusarium dry rot are susceptible to infection by secondary soft rot bacteria which may invade the wounded potato.

### Planting



Fusarium dry rot was confirmed on seed potatoes in Massachusetts this spring. Inspect seed for diseases before planting and submit suspect tubers to the UMass Diagnostic Lab. Photo: C. Averre

(continued on page 31)

## Bruising on Strawberry Leaves

*Jerry Brust*

Over the last few weeks I have been sent pictures of and have seen dark spots on the foliage of strawberry plants (Figures 1 and 2). These spots can look pretty bad at times and are thought to possibly be the start of some disease, such as angular leaf spot or anthracnose. The dark spots are usually on the upper or lower surface of the leaf, but at times can be found on both surfaces of a leaf. These damaged areas of strawberry foliage can be very disconcerting when they appear as dark spots on the stems (Fig. 3). No bacteria or fungi have ever been found associated with these dark spots. I have seen this type of discoloration in strawberry foliage early in the season many times over the years and have never seen the spots turn into any disease problem or any other type of problem. The best that we can come up with is that the plant has 'bruised' foliage. And as you look at the spots this is exactly what the damage looks like (kudos to Karen Rane for coming up with this description of the damage). This damage usually appears within a short time span after high winds occur. Figure 4 shows a good example of this as you can see the bruised areas of the leaves that appeared a few days after a very windy period on April 15. Also notice the tattered appearance of the leaf edges demonstrating that these leaves were knocked around a great deal. It is possible that disease organisms might enter the plant through this damaged tissue, but I have never seen this occur to any extent in the field—even during the wettest spring. Nothing needs to be done about this bruising, growers just need to be aware of the possibility occurring after wind events.



Figure 3. Strawberry stem with dark spot



Figures 1 and 2. Dark spots on strawberry leaves often mistaken for the start of foliar diseases.



Figure 4. Strawberry leaf with bruises and tattered margins

*Dr. Brust is the IPM Vegetable Specialist at the Univ. of Maryland. From the **Weekly Crop Update**, Univ. of Delaware Coop. Extension, Vol. 27, Issue 5, April 26, 2019*

## BERRY PRODUCTION

## Establishing Blueberries – Plan Now for a 2020 Planting

Gordon Johnson

Blueberries are very specific in the type of soil conditions in which they will grow. The ideal blueberry soil will be sandy but with high levels of organic matter, it will have a pH between 4.5 and 5.0, it will be well drained in the surface soil but will ample subsurface water. These are the conditions of southern New Jersey where blueberries are native and where there are large commercial plantings. We only have a small area of Delaware with those characteristics; the “black soils” were marshes were drained in southern Sussex County. In all other areas of Delaware, it is necessary to recreate those conditions.

There are five keys to success with blueberries:

- 1) Increase soil organic matter before planting
- 2) Drop soil pH to between 4.5 and 5.0 and bring phosphorus and potassium up to optimum or high levels prior to planting
- 3) Put organic material in the planting hole during planting
- 4) Mulch the plants well after planting
- 5) Install a drip irrigation system

The following are some more details on each of these keys.

A common mistake is to plant blueberries before the soil has been modified. Normal agricultural soils will have a pH around 6.0 and organic matter below 2%. Blueberries will not grow well in these conditions. Begin modifying the soil at least one year in advance of planting.

To increase organic matter, plant cover crops and consider amending the soil with additional organic sources such as pine bark fines. Do not use composts that have high pH.

The pH of the soil will need to be modified. This is done by adding elemental sulfur at recommended rates according to soil type and the amount of pH drop required. Again, the target is between 4.5 and 5.0. Blueberries are among a group of unique plants that are acid loving in contrast to most other crops, which require a higher pH. Sulfur additions to lower pH must be done the year before planting. This is because bacteria in the soil need to react with the sulfur to form an acid that lowers the pH. This only occurs when soil temperatures are warm and it takes several months for the full reaction to take place. You cannot apply sulfur in the year of planting and expect the soil pH to be in the acceptable range for good first year growth. Sulfur rates will depend upon soil types and starting pH.

During the year when you are modifying soil, add phosphorus and potassium to bring soil levels to optimum for those two nutrients prior to blueberry planting. Use Potassium Sulfate as the potassium source.

After the soil has been properly modified, you can plant the blueberries. This is normally done in the spring. Fall plantings are possible but there are higher risks of plant loss in harsh winters. When laying out plantings and deciding on between row spacing, think about how you will apply mulch and pesticides and whether you will be using netting to exclude birds. Rows will need to be wider if large equipment is used for mulching or spraying, but wide row spacing will increase costs if netting is needed to prevent bird damage.

Another key to planting blueberries is to add organic matter to the planting hole. The most common practice for smaller plantings is to use one gallon of moistened peat moss in each hole. Other organic materials can be substituted but they should be low in pH and should be at least partially decomposed. Most commercial composts are not acceptable because the pH is too high for blueberries. Also, composts made with manures as a component may have too high of salt levels and can injure the blueberry roots.

After planting, blueberries should be mulched heavily. Blueberry roots are shallow and need to be protected from high soil temperatures. In addition, the mulch will conserve soil moisture and provide additional organic matter as it slowly decomposes. Blueberries are also very sensitive to weed competition and mulch helps to prevent weed growth. The best mulch materials are high in lignin and acidic in nature. Pine bark is ideal but is often not readily available. Aged wood chips or ground yard waste that has been aged makes good mulch. Sawdust must be partially decomposed before use to avoid nitrogen deficiencies. Avoid mulches that increase soil pH.

Drip irrigation is recommended for blueberries and is best placed under the mulch. Because blueberries are shallow rooted, frequent irrigations during our hot summers will be needed to get the plants established and growing well. Two drip lines per bed, one on either side of the plants, optimizes rooting area, especially in sandy soils. Overhead irrigation can also work if designed properly.

Do not put fertilizers in the plant hole and avoid adding any fertilizer until plants are established. In the first year, blueberries will need about 20 pounds of nitrogen and nitrogen should be in the form of ammonium sulfate or urea. Do not use N sources that contain nitrate. Do not use fertilizers containing chloride (such as KCl – potash).

Place plant orders the year prior to planting. Plants may come as bare root plants, large liners, or potted plants. Large liners and pots have less risk of planting losses. Choose northern high bush varieties recommended for our region. Current recommendations can be found in the Mid-Atlantic Berry Guide. The University of Delaware has conducted trials with additional varieties (many southern highbush types). Contact Emmalea Ernest ([emmalea@udel.edu](mailto:emmalea@udel.edu)) for results and additional recommendations.

Blueberries cannot tolerate standing water at any time and site selection is important. Choose well drained sites and consider raising beds or ridges to improve drainage where needed.

*Dr. Gordon is the Extension Vegetable and Fruit Specialist at the Univ. of Delaware. From the Weekly Crop Update, Univ. of Delaware Coop. Extension, Vol. 27, Issue 2, April 5, 2019.*

## VEGETABLE PRODUCTION

### Viable Options for Managing...

(continued from page 16)

ground soil that was previously cropped with brassica cover crop. While the connection between the impact of cover crop and ALM and mycorrhiza was not yet made, we are currently working on the data to deduce any correlations.

The use of row cover for one month to cover onion seedlings was enough. Using row cover would be also another viable tool for allium growers to use for protecting the young seedlings from any ALM attack early in the season. Beyond one month, we did not see significant improvement in yield or further protection from ALM, possibly due disappearance of ALM female adults at that time. Unlike Cortland and Talon, Sedona yield can be 46% greater when grown in beds where soils were previously cropped to brassica cover crop mixture and covered with black plastic.

*Dr. Zinati and Dr. Smith are with the Rodale Institute. This project was funded by the Pennsylvania Vegetable Marketing and Research Program and PVGA.*

**Seed Potato...** (continued from page 28)

The ideal seedbed for planting potatoes is warm, medium field capacity in moisture content, and of uniform texture allowing good soil air movement. Soil temperatures should be 50°F to 60°F in order to encourage cut seed wound healing and rapid growth (most of the state is over 50 now, except for the eastern coastal areas—see soil temperature map at <http://newa.cornell.edu/index.php?page=soil-temperature-map>). Do not plant cut seed in soil below 45°F as seed piece decay will be encouraged.

A well-prepared seedbed is desirable and will facilitate accurate planting. Over-preparation of the seedbed should be avoided because of crusting and compaction problems.

Close spacing in the row (6" to 8") aids in reducing tuber size and increases the number of tubers set. Using close spacing can reduce the occurrence of hollow heart and growth cracks. Seed pieces should be planted 2" to 4" below the soil level; this will reduce problems with sunburned tubers. For rapid emergence, no more than 2" of soil should cover the seed piece after planting. Where seed is planted deeper than 2", drag-off, or the removal of the excess soil from the top of the hill, may be employed to encourage rapid emergence. Rapid emergence should be encouraged to reduce problems with soil-borne diseases such as Rhizoctonia.

The practice of pre-sprouting seed potatoes is called green sprouting or chitting. This practice accelerates plant emergence and speeds the development of marketable tubers. Many times it gains the producer as much as 7 to 10 days in having marketable tubers. This practice is often combined with close plant spacing (about 6"). The tubers are harvested when small and often sold in quart baskets. Consumers usually cook the tubers in their skins.

The basic technique is rather simple: About 6 weeks prior to planting, spread the seed tubers in open-top crates, boxes or flats, 1 layer deep with the eyes up. Egg cartons for small seed lots work great. The flats are then kept in a warm place (approximately 70°F) where light levels are medium intensity (bright shade). Direct sunlight is not recommended. The warmth stimulates the development of strong sprouts, which, in the presence of light, will remain short and stout and will not easily be broken off during the planting process. Ideally, the sprouts will be about 1" in length. Do not cut the seed before green sprouting. Cutting seed pieces prior to green sprouting will encourage desiccation and reduce seed quality.

From the *New England Vegetable Management Guide* as reprinted in the *Vegetable Notes for Vegetable Farmers in Massachusetts, Univ. of Mass. Extension, Vol. 31, No. 5, April 25, 2019.*

**Equipment**

**FOR SALE – BLACKMORE GREENHOUSE MANUAL TRANSPLANTER** serial number 01T0110 and **BERRY PRECISION SEEDER** sold together. Call 814-793-2976.

**FOR SALE – MIST SPRAYERS**

Many options. Spray orchards, produce, vineyards, etc. Low Volume – High Pressure. Using air as the carrier. They use less water as well as being more effective and more efficient with less chemical.

Swiharts, Quinter, KS. 785-754-3513 [swihartsales.com](http://swihartsales.com)

**FOR SALE – USED ‘BERTHOUD’ AIRBLAST** - Pull type - PTO Drive - 3 Piston Pump - Gear driven 33" Fan – approx. 160 Gals - Stored inside - Vineyard and Fruit Trees

Call - H. Bolkey 1-814-434-0461 / 1-814-474-2177 03

**REMEMBER**

*Classified Ads are Free for PVGA Members for Non-Commercial Sales.*



**STAND ‘N PLANT**

**SEEDER**

Use for...

- Seeds
- Onions
- Garlic



*Easily plant hundreds of seeds or plants per hour into plastic covered or bare ground seed beds.*

**PLANTER**

Use for...

- Transplants
- Potatoes
- Bulbs



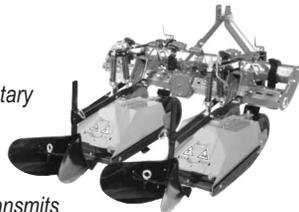
**Stand ‘N Plant**

95 Rose Road, Saltsburg, PA 15681

Phone: 724-639-3965 or visit: [www.standnplant.com](http://www.standnplant.com)

**Multivator Cultivators**

A **MULTIVATOR** is a high-clearance rotary tillage machine designed for inter-row cultivation of vegetable, nursery, fruit & field crops. Mounted on 3 pt. hitch of tractor & powered by the PTO, it transmits power to a selected number of rotary tiller heads equipped with blades that cultivate ground between rows of growing crops. Weed growth is eliminated & crusted or compacted soils are transformed into tilth.



572 Industrial Dr., Lewisberry, PA 17339

717-938-5100 • Fax: 717-938-8769

[www.jswoodhouse.com](http://www.jswoodhouse.com) • email: [info@jswoodhouse.com](mailto:info@jswoodhouse.com)

VEGETABLE FARM EQUIPMENT AUCTION SPECIALISTS

**PIRRUNG AUCTIONEERS, INC.**

**JAMES P. PIRRUNG**

[www.pirrunginc.com](http://www.pirrunginc.com)

**585-728-2520**

*“Serving the Buying - Selling Needs of Farmers Across America Since 1948”*

**Pennsylvania Vegetable Growers Association**  
815 Middle Road  
Richfield, Pennsylvania 17086-9205  
717-694-3596  
pvga@pvga.org  
www.pvga.org

PRESORTED  
STANDARD  
U.S. POSTAGE  
**PAID**  
MIDDLEBURG PA 17842  
PERMIT NO. 26

**Address Service Requested**



# STOKES<sup>®</sup>

SEEDS

## *Seed and Service*

Stokes Seeds offers a comprehensive product line from world-class suppliers for commercial growers of all sizes.

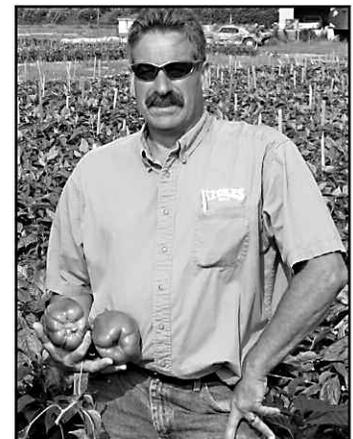
Stokes Seeds provides grower-specific seed prescriptions to meet growers' production and profit goals.

## **Stokes Seeds' Pennsylvania Seed Consultants**



**Tom Pagels**  
609-247-7140

[tpagels@stokeseeds.com](mailto:tpagels@stokeseeds.com)



**Tom Dauria**  
908-489-4896

[tdauria@stokeseeds.com](mailto:tdauria@stokeseeds.com)

— **Quality Seed Since 1881** —

1-800-263-7233 | [www.stokeseeds.com](http://www.stokeseeds.com) | Box 548 Buffalo NY 14240-0548