



2022 Summer Grower Educational Opportunities

The usual focus of our special June newsletter is to publicize the summer educational events conducted by Penn State Extension and Pasa Sustainable Agriculture.



Digging into the Science of Nutrient Density – July 27

12:00 to 1:15 p.m. Pasa Webinar

Whether you grow food, sell it, cook it, or just eat it—we all have a stake in gaining a deeper understanding of the links between soil health, plant health, and human health.

The concept of nutrient-dense food has been growing in popularity for decades, but how do we actually define and quantify it? During this webinar, we'll explore the science behind on crop nutrient density, including how it can be measured, what new research is uncovering, and what we still need to learn. We'll examine how factors like growing climate, management practices, and variety have the potential to broadly impact nutrient density.

The Bionutrient Institute founder and life-long farmer Dan Kittredge and co-founder of OurSci Dan TerAvest have been studying samples from farms across the country to help us better understand connections between the way food is grown and its nutrient content. Pasa partners with The Bionutrient Institute and OurSci to measure the nutrient content of crops grown by several farmers participating in our Soil Health Benchmark Study. Farmer Steve Groff of Cedar Meadow Farm will share insights he's gained from participating in this study.

Sponsored by Pasa Sustainable Agriculture. Cost is \$5. Register at <https://pasafarming.org/event/digging-into-the-science-of-nutrient-density/>.

Penn State Flower Trials July 28

8:00 a.m. to 3:00 p.m. Southeast Agricultural Research and Extension Center, Manheim, PA

The Flower Trials Field Day is an annual event to showcase the Penn State Flower Trials network with industry representatives and connect with customers. The Penn State Flower Trials have

close to 1,000 varieties displayed of both annual and perennial plant selections submitted by 30 companies from around the globe. Attending this event will give you an opportunity for networking with green industry professionals, as well as see all the great plants. The morning will include a tour of the trials and a visit with breeders from Ball Horticultural and Syngenta Flowers. After a beef brisket buffet luncheon, Margery Daughtrey from Cornell University will review disease control strategies while Genevieve Christ from Penn State Extension will discuss different pesticide formulations, how they work and best management practices. Two category and two core pesticides credits are expected to be available to growers. Cost is \$60. Register by July 25 at <https://extension.psu.edu/flower-trials-field-day> or at 877-345-0691

Ag Progress Days – August 9 to 11

9:00 a.m. to 5:00 p.m. (9th); to 7:00 p.m. (10th); 4:00 p.m. (11th)
Russell Larson Ag Research Center, PA Furnace, PA

While there will not be vegetable equipment demonstrations at this year's Ag Progress Days as there have been for the past several years, there will be a large variety of farm equipment on display. PVGA will have an exhibit in the ECM Building to promote vegetables to the general public and to encourage PVGA membership. Visit <https://agsci.psu.edu/apd> for further details.

Adding Trees to a Draft-Powered Vegetable Farm – August 17

4:00 to 7:00 p.m. Good Work Farm, Nazareth, PA

Join us at Good Work Farm to tour the first plantings of their new alley cropping system, and learn how trees can boost your farm's economic and climate resilience. Alley cropping is an ancient practice, defined by the USDA as "the planting of rows of trees and/or shrubs to create alleys within which agricultural or horticultural crops are produced."

Farmers Lisa Miskelly and Anton Shannon got interested in adding this agroforestry practice to their draft-horse-powered vegetable operation because of the potential to diversify their income while also helping mitigate flooding they've been experiencing from increasingly frequent and severe rain events. Pasa connected them with agroforestry consultants at Interlace Commons as part of our work with the Natural Resources Conservation Service to pilot alley cropping systems in Pennsylvania. Earlier this spring, Good Work Farm started incorporating perennial strips of fruit (apples, asian pear, pear) and ornamental woody cut-stem trees (willow, dogwood) as well as elderberry bushes in their annual vegetable production fields.

Sponsored by Pasa Sustainable Agriculture. Refreshments will be provided. This project is supported by a USDA Conservation Innovation Grant and funding from the William Penn Foundation. Cost is \$20. Register at <https://pasafarming.org/event/alley-cropping-adding-trees-to-a-draft-powered-veg-farm/>



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Wednesdays: 12:30-1pm

Update with: 6/15 thru 9/7

Live Call-In: 681-999-0224

Access Code: 832191

Recordings: 757-841-1091

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Questions:

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The Importance of Community

This spring we have witnessed the power of “community” in watching the relatively small nation of Ukraine under the bold leadership of their president hold off the invasion of their country by Russia, a world power. Whether they can outlast Russia in the long term remains to be seen, but few expected Ukraine to be as successful in resisting the Russians as they have been. The sense of “community” among the Ukrainian people is one of the keys to their strength.

We all have our “communities” of our extended families, our neighborhoods, our churches and other organizations, and our towns or townships, as well as our state and nation. And there is the group of people we interact with daily in the course of our work as well – our employees/employers, our fellow workers, our customers, and our suppliers. For many growers, the local produce auction with the group of growers and buyers that make the auction run is a “community” that provides an opportunity for personal interaction where we can exchange ideas and experiences as well as offer encouragement and be encouraged.

PVGA is the “community” that brings together vegetable, potato and berry growers and others involved in those industries or just interested in those industries. PVGA provides the opportunity to stay informed about what is happening in the statewide grower community. We do that through this monthly newsletter, the Pennsylvania Vegetable Growers News and through our weekly email, the PVGA Update. The newsletter provides not only news about the Association, current events, and legislation/regulations that affect growers, but also practical production information from Penn State Extension and from other extension services. The email update includes links to articles of interest to growers from various online sources – enabling vegetable, potato and berry growers to see a variety of articles pertaining to their industry all in one place. PVGA also maintains a website at www.pvga.org with various information about the Association like its policy resolutions and legislative priorities as well as past issues of the newsletter along with an index of the articles in the newsletter since 2009. A complete restructuring of the website has just been completed with a membership directory and videos of some past Convention sessions and farm visits. We have also added “Resource” pages for vegetable, potato and berry growers that contain links to various educational materials.

PVGA also helps sponsor the Mid-Atlantic Fruit and Vegetable Convention, one of the premier grower meetings in the eastern United States. Plans are being made for 2023 Convention on January 31 to February 2 at the Hershey Lodge. While the virtual version of the Convention held in February 2021 was very successful in providing educational sessions for those able to ac-

cess the internet, attendees really missed the person-to-person interaction – the “community” aspect – of the “normal” in-person event that is missing in a virtual event. Both attendees and exhibitors appreciated being able to be able to talk to each other face-to-face, taste the samples, and kick the tires in the trade show in 2022. The Mid-Atlantic Convention is perhaps one of the best examples of how PVGA fosters a sense of community among growers – bringing them together physically from all across the state (and actually from many surrounding states as well). While growers greatly value the educational sessions featuring expert speakers from Penn State and numerous other universities, many also comment that they learn as much from their conversations with fellow growers in the hallways.

Another “community” aspect of PVGA is the Association’s food booth at the Pennsylvania Farm Show. Over 200 members and friends of the Association staff the food booth each year to earn funds to support research. Over the past 34 years, PVGA as a grower “community” has contributed \$1.36 million to vegetable and berry research. (Another part of the grower “community”, the PA Vegetable Marketing and Research Program has contributed another \$730,000 to vegetable research.) This has been possible primarily with profits from the Farm Show food booth (as well as profits from the Mid-Atlantic Convention). Like the Convention, the Farm Show food booth allows growers to work together and share conversation with their fellow growers.

PVGA is resuming sponsorships of local grower meetings this season and the “Are You Crazy?” farm market tour in 2023 in the near future – more events that help create “community” among growers. And PVGA continues to communicate the concerns of the growers to government officials on issues that affect growers – another “community” function of the Association.

But the bottom line is that to benefit from any of these initiatives, YOU have to belong and YOU have to attend. **We invite you to join PVGA for the rest of 2022 for the half year rate of \$37.50. You can do so online at www.pvga.org or simply sent a check for \$37.50 with your name, address, email and phone to:**

**PVGA
815 Middle Road
Richfield, PA 17086**

PVGA members receive this newsletter every month and, if you give us an email address, our weekly email “PVGA Update”. Plus, you become a contributing member of the grower community. We urge you to plan now to attend the 2023 Mid-Atlantic Convention – and we would greatly appreciate your help at the 2023 Farm Show food booth.

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Boosting Productivity on an Urban Orchard – August 19

10:00 a.m. to 1:00 p.m. Weavers Way Farms – Henry Got Crops, Philadelphia, PA

Kiwis, asparagus, hazelnuts, and more! Tour the new plantings at Weavers Way Farms and learn how alley cropping is helping them get more out of their orchard in Northwest Philadelphia.

Weavers Way Farms, part of the member-based Weavers Way Co-op, has had a long-term goal for revamping the orchard at Henry Got Crops, one of their two urban farm sites. Pasa connected them with agroforestry consultants at Interlace Commons as part of our work with the Natural Resources Conservation Service to pilot alley cropping systems in Pennsylvania. Weavers Way’s design

will help them get more out of each acre by incorporating popular perennial vegetable and flower crops in the alleys between their existing trees and expanding the orchard diversity with additional fruit, nut, and ornamental tree varieties. Earlier this spring farm managers, student volunteers, and forestry professionals planted a variety of new products on the site—from kiwis and asparagus to garlic and hazelnuts. Come check out the results!

Sponsored by Pasa Sustainable Agriculture. Lunch will be provided. This project is supported by a USDA Conservation Innovation Grant and funding from the Philadelphia Committee of the Garden Club of America. Cost is \$20. Register at <https://pasafarming.org/event/alley-cropping-boosting-productivity-on-an-urban-orchard/>.

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NEWS

Penn State Extension Expands Resources for Growers at Produce Auctions



Educational materials are displayed at the Penn State Extension kiosk at the Sugar Valley Produce Auction in Loganton in July 2021. The kiosks provide information on production and food safety issues for growers, many of whom are members of Plain communities that don't use technologies to access information online. Credit: Courtesy of Beth Gugino. All Rights Reserved.
Alexandra McLaughlin

Penn State Extension is expanding a program that offers educational kiosks at produce auctions across the state. These kiosks provide growers with timely, relevant information on disease and pest identification and management, invasive species, and food safety.

Beth Gugino, professor of vegetable pathology in Penn State's College of Agricultural Sciences, and her colleagues on the vegetable, small fruit and mushroom extension team, have guided the development and implementation of this program.

Pennsylvania has 16 wholesale produce auction locations where growers can sell in-season produce, flowers and other goods in bulk to local grocery chains, farm market stores and independent retailers.

This year, Penn State Extension will add three new kiosks to serve a total of 13 auctions across the state, including the Belleville Livestock Auction.

"The Amish and Mennonite communities play a major role in

the vegetable-production industry across Pennsylvania," she said. "Making sure that they have access to the same information as those who utilize online resources is important to ensure that they can continue to produce crops, not only to support their families, but also to continue to support Pennsylvania's agriculture industry."

Initial funding for the project came from the Plant Health Resource Center, which is part of the Ag Resource Centers initiative between Penn State and the state Department of Agriculture. Penn State Extension continues to support the endeavor.

Glass-enclosed panels on the kiosks allow information to be displayed and updated easily. Informational pamphlets are available for growers to take home. A few years ago, the team added lending libraries to some of the produce auctions for growers to borrow hard-copy resources.

Each year, the team designs five or six new posters based on issues they see in the field. This year saw new posters on cucurbit viruses, rust on sweet corn, strawberry crown-root diseases, high-soluble salt levels in high tunnel soils, the Food Safety Modernization Act, and postharvest winter squash rot. The posters are designed to enable the team to update or reuse them as needed.

"Some topics are relevant for the whole season, while others are only a problem at certain times," said Bob Pollock, horticulture extension educator based in Indiana County. "We rotate the posters in and out depending on the topic and when it's relevant."

Another new feature is the "PA Produce Grower" newsletter distributed every other week that summarizes issues extension educators are seeing on produce farms and greenhouses across the state. The newsletter covers production issues related to insects, diseases and plant nutrition and consists of one sheet of paper with information printed on both sides. Each issue appears on different colored paper to help growers recognize a new edition.

The resources have expanded this year to include more information on postharvest and food-safety considerations. "Rather than focusing strictly on pests, we're including other production-related issues as well," Gugino said.

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Vegetable Disease ID & Prevention with Dr. Beth Gugino – August 23

12:00 to 1:30 p.m. Pasa Webinar

Find out how to recognize the early signs of diseases and take steps to prevent them. Taking an Integrated Pest Management (IPM) approach on sustainable and organic farms is all about planning, observation, and timely responses—nowhere is that more true than with plant disease.

Join Dr. Beth Gugino, Penn State University professor and extension specialist in vegetable pathology, to learn about observation and diagnostic tools you can use to recognize the signs of different diseases quickly, and how respond to before they get out of control. We'll also discuss steps you can take to prevent disease in your crops.

Dr. Gugino's current research focuses on management of onion bacterial diseases, identification of soil-borne pathogens that affect tomato high tunnels, and identification of bacteria associated with soft rot and other potato diseases common in Pennsylvania.

This session is part of our IPM Perspectives series, featuring experts offering unique insights, tools, and techniques to help you manage pests on your farm in a more proactive and sustainable way.

Sponsored by Pasa Sustainable Agriculture. Cost is \$10. Register at <https://pasafarming.org/event/vegetable-disease-id-and-prevention-with-dr-beth-gugino/>.

Other Opportunities

PVGA Berry Growers Info Exchange

PVGA is continuing to host a periodic get-together for berry growers. During the summer months, these "Info Exchanges" will be twice a month on the following dates: July 11, July 25, August 8 and August 22, all at 8:00 p.m. Meetings are designed to give growers a chance to get time-sensitive updates on current issues from state and regional extension personnel, exchange info with other growers, get answers to their questions, or just listen in or bounce thoughts off of others. Kathy Demchak is the host.

Calls are open to PVGA members and non-members to maximize information exchange, so spread the word and invite your friends and neighbors to join.

The Zoom link is <https://us02web.zoom.us/j/83077021881>

The call-in numbers are (be aware that this is not a toll-free call):

+1 929 436 2866 US (New York)

+1 301 715 8592 US (Washington DC).

The meeting ID is 830 7702 1881

If you have questions, contact us at pvga@pvga.org or 717-694-3596.

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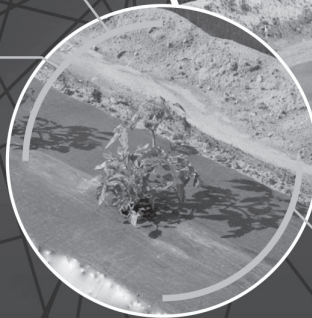
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NEWS

State News Briefs

Pennsylvania Department of Agriculture (PDA) Board Vacancies

PDA houses 35 active state-level boards and commissions and is seeking representatives from the following sectors to fill current vacancies:

Ag Land Condemnation Approval Board

Vacancies: 1 farmer.

Purpose: The board oversees the condemnation of farmlands enrolled in the Agricultural Security Area, or ASA, or other productive farmlands. The Bureau facilitates the ALCAB. The board convenes on an as-needed basis whenever a petition to condemn is submitted to the Secretary of Agriculture. The board is comprised of representatives from the Departments of Agriculture (chair), Environmental Protection and Transportation, in addition to a representative of the Governor's Office and two farmer members. Certain exemptions to board jurisdiction include work to existing highways and projects that have Federal Energy Regulatory Commission (FERC) or Pennsylvania Public Utility Commission (PUC) approval.

Ag Land Preservation Board

Vacancies: 1 farm owner and operator. 1 residential, commercial, or industrial building contractor (nominee currently pending).

Purpose: Pennsylvania leads the nation in the number of farms and acres permanently preserved for agricultural production. The program guarantees a future food supply and contributes to a healthier economy. It also assures a way of life Pennsylvanian's cherish will continue for generations to come. The program is a partnership between all levels of government and non-profit organizations-with a common goal of saving prime farmland.

Ag and Youth Advisory Board Vacancies: 1 or 2 representatives from a farm or rural organization that has a youth program. 1 youth representative of an urban agriculture or garden operation. Purpose: A program for administering grants for agriculture and youth organizations

Controlled Plant and Noxious Weed Council

Vacancies: 1 member of a farm organization or member of PA Farm Bureau. 1 member from

the ornamental, turf, horticultural industry, or from PA Landscape and Nursery Association.

Purpose: The Pennsylvania Department of Agriculture (PDA) regulates the Controlled Plant and Noxious Weed Control List and implements federal and state eradication and control programs.

Fertilizer Advisory Committee

Vacancies: 2 members representing production agriculture. 1 agriculture fertilizer manufacturing representative. 1 fertilizer

research representative. 1 member representing environmental interests/issues. 1 nutrient management representative. Purpose: The Fertilizer Advisory Committee provides a forum for representatives from production agriculture, agricultural research, turf maintenance, manufacturing and nutrient management to share information about research, technology and regulations affecting Pennsylvania's fertilizer industry.

Vegetable Marketing Board

Purpose: Represents each producer who does one or more of the following during a particular marketing season:-Grows one or more acres of vegetables within this Commonwealth for the purpose of selling said vegetable;-Grows vegetables in one or more greenhouses located within this Commonwealth if: (1) the greenhouse(s) is/are used for growing vegetables in 1,000 square feet or more of growing space; (2) the vegetables are grown for sale; and (3) the vegetables are not grown to be transplanted outdoors; or-Grows vegetables within this Commonwealth and sells \$2,000 or more of the vegetables grown in a given marketing season.

Pennsylvania Farm Bureau Hosts EPA Region 3 Officials

The state Senate has passed legislation that would identify Pennsylvania Farm Bureau hosted EPA Region 3 Administrator Adam Ortiz and members of his staff for a discussion on continuing to advance our shared commitment to improving local Pennsylvania water quality and, by extension, the health of the Chesapeake Bay on Thursday in Camp Hill.

Farm Bureau leaders and staff spoke about efforts to secure critical funding to help farmers expand their installation of conservation practices in the Bay watershed, stressed the importance of making sure farmers are credited for all practices implemented (especially those installed at a farmer's own expense, which can be easily overlooked) in the coming update to the Chesapeake Bay Program's computer model of the Bay watershed and pledged continued action on both fronts.

Ortiz and his colleagues stressed the importance of their partnership with Farm Bureau, praised the hard work that Pennsylvania farmers have already put into improving local water quality, and expressed that they will continue to press Pennsylvania state officials to increase the resources available to farmers for water quality projects.

The event concluded with a press conference featuring Administrator Ortiz and Pennsylvania Farm Bureau President Rick Ebert.

From Farm Bureau Express, Penna. Farm Bureau, June 10, 2022.

National News Briefs

Reminder to File Federal Heavy Vehicle Use Tax Returns if 55,000 Pounds or Over

Pennsylvania Farm Bureau (PFB) has recently fielded calls that PennDOT is rejecting renewal applications for farm-plated vehicles with registrations 55,000 pounds or over if the federal heavy highway vehicle use tax return (HVUT) form has not been filed.

Owners of registered vehicles with a registered gross weight of 55,000 pounds or more, including registered farm vehicles, are required to file each year a federal HVUT return (Form 2290) with the IRS, regardless of whether the owner is required to pay tax on the vehicle.

Agricultural vehicles operated 7,500 miles or less during the HVUT's tax year (July through June) are exempt from payment of

tax, as well as other vehicles operated 5,000 miles or less during the tax year.

Many farmers will be able to complete their return by simply declaring that the truck will qualify for the mileage exemption. Pages 7-8 of the Instructions to Form 2290, which are included in the above link, outline how to claim the exemption. Form 2290 must be filed by the last day of the month following the month of first use.

So, if a farmer first uses the heavy vehicle on the roadway in July, they would need to file form 2290 by August 31 of the following month.

From Farm Bureau Express, Penna. Farm Bureau, June 10, 2022

FOOD SAFETY

Cleaning Food Contact Surfaces – Detergents

Robert Hadad

How do you effectively clean food contact surfaces? Have good tools. Use a detergent. Follow up with a sanitizer. I know what you're saying: "wait, what? Detergents? Aren't sanitizers enough?"

No, they aren't.

Let's think of it this way. When washing dishes, do you just rinse them under water and pour bleach on them? Or do you rinse, scrub with a detergent, rinse again, then dry? A detergent helps lift off stuck-on vegetative material and vegetable oils.

Not all detergents are created equal. What you should use for cleaning tools, harvest bins, table surfaces, dunk tanks, sinks, wash equipment, is a product that is unscented and free from dyes. The reason for "free and clear" type of products is in case the final rinsing doesn't get all the soap off. It also would be nice to use a product that is "low suds". A lot of suds makes it harder and takes longer to remove the residual soap. Products can be found in grocery stores, building material box stores, and some of the supply catalogs and online sites. If you are not sure if a product covers what you need, contact the manufacturer.

If you are adhering to the FSMA produce safety regulations, three sections pertain to cleaning:

§112.116(b) [food packaging]: If you reuse food-packing material, you must take adequate steps to ensure that food contact surfaces are clean, such as by cleaning food-packing containers or using a clean liner.

§112.123(d)1 [equipment and tools]: You must inspect, maintain, and clean and, when necessary and appropriate, sanitize all food contact surfaces of equipment and tools used in covered activities as frequently as reasonably necessary to protect against contamination of covered produce.

§112.123(d)2 [equipment and tools]: You must maintain and clean all non-food-contact surfaces of equipment and tools subject to this subpart used during harvesting, packing, and holding as frequently as reasonably necessary to protect against contamination of covered produce.

Remember, the detergents you want to use are dish and kitchen types NOT LAUNDRY detergent.

The USDA National Organic Program allows for the use of detergents not OMRI approved but growers need to list the brands being used and they must rinse off the products thoroughly.

For more information on cleaning and sanitizing, wash/pack facility issues, the soon-to-be required agricultural water self-assessments, AND the forthcoming traceability requirements, contact Robert Hadad 585-739-4065 rgh26@cornell.edu. We are available for calls, zoom conversations or in-person farm visits to go over all of your food safety issues.

Mr. Hadad is with the Cornell Vegetable Program. From the VEGEdge, Cornell Coop. Extension, Vol. 18, Issue 12, June 29, 2022.

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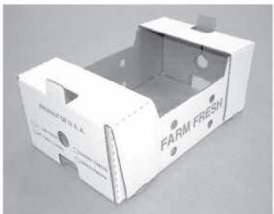
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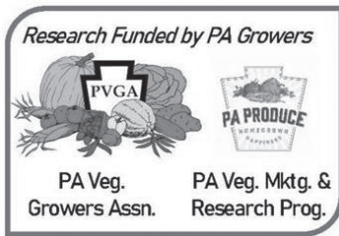
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VEGETABLE PRODUCTION

Evaluating Burndown Options for No-till Snap Bean

Mark VanGessel, John Wallace, Dwight Lingenfelter and Lynn Sosnoskie



Many farmers are interested in growing snap beans with no or limited tillage for many reasons, including soil health, time savings, fuel savings, and moisture conservation. However, effective “burndown” herbicide options are essential in order to control existing vegetation so snap

beans are planted into a “clean” field. These herbicides need to provide excellent weed control for winter annual weeds and early-emerging summer annual weeds. In addition, these herbicides cannot cause injury to the snap bean crop. Glyphosate has been used extensively for this purpose but with the spread of glyphosate-resistant weeds (i.e. horseweed, Palmer amaranth, and common ragweed) as well as presence of species less susceptible to glyphosate (i.e. primrose, mustards, filaree), requires additional control options. Grain farmers have not replaced glyphosate, rather are including tank-mix partners to improve control. Three herbicides have been used routinely with glyphosate for this purpose, Liberty, Sharpen, and Elevore. None of these herbicides are currently labeled for this use and research is needed to demonstrate the crop safety.

The objective of this trial is to evaluate potential burndown herbicides for no-till snap bean production. This experiment will focus on snap bean safety since the herbicides included in this trial have been used extensively in agronomic research, so their weed control attributes are well established.

Materials and Methods

A field trial was conducted in 2021, at University of Delaware’s Carvel Research and Education Center in Georgetown (DE), Cornell’s AgriTech Experiment Station in Geneva (NY), and Penn State Horticultural Research Farm in Rock Springs (PA). Soil type at the sites were sandy loam (DE), loam (NY), and silt loam (PA).

Herbicide treatments were Liberty 280 (glufosinate) at 1 qt/A, Sharpen (saflufenacil) at 1.5 fl oz/A, and Elevore (halauxifen) at 1 fl oz/A. Herbicides were applied at either 10 or 3 days prior to planting snap beans. Applications were made with CO₂-pressurized backpack sprayers calibrated to deliver 20 GPA to plots that were two or four rows wide and 20 to 30 feet in length. Untreated plots were included as a comparison for ratings. New York was not able to include Elevore treatments. All treatments were replicated three to four times at each site.

Snap beans were seeded at 65,000 to 110,000 seeds/A depending on the site. Snap bean varieties were ‘Caprice’ in Delaware, ‘Huntington’ in New York, and Delaware planted lima beans (‘Cypress’) as well as snap beans. Injury ratings (stunting and necrosis) on a scale of 0% (no injury) to 100% (complete plant death) were made at weekly intervals at each location. Stand counts were collected in DE and NY, although at different stage of the bean crop. Snap bean biomass was collected in DE, and yield data was collected in NY.

Results

Plots were rated 2, 3, and 4 weeks after planting (WAP). However, by 4 WAP stunting was often confounded with herbicide injury and summer annual weed competition.

Liberty applied 10 days prior to planting had the least amount

of injury of all the treatments evaluated. Across the three locations, less than 5% injury was observed at 2 and 3 WAP. If Liberty was applied 3 days before planting, injury was more likely to occur and ranged from 0 to 27% at 2 WAP and 3 to 15% at 3 WAP.

Stunting from Elevore applied 10 days prior to planting ranged from 8 to 15% at 2 WAP and 0 to 10% at 3 WAP. Elevore applied 3 days prior to planting ranged from 23 to 53% injury at 2 and 3 WAP. Substantial injury from Elevore applied 3 days prior to planting occurred at all locations and plants were slow to recover.

Sharpen was the most injurious herbicide treatment. Delaying the time between the application and planting improved safety; however, injury was not acceptable and ranged from 35 to 99% when rated at 2 and 3 WAP.

Snap bean injury at 2 and 3 weeks after planting (WAP), averaged over three locations.

Herbicide	Days before planting	Injury 2 WAP*			Injury 3 WAP*		
		DE	NY	PA	DE	NY	PA
		----- % injury -----			----- % injury -----		
Elevore	10d	15 e	-	8 f	0 i	-	10 gh
Elevore	3d	53 b	-	23 d	23 f	-	40 d
Liberty	10d	0 h	3 g	0 h	2 i	5 hi	0 i
Liberty	3d	27 d	10 ef	0 h	15 g	13 g	3 hi
Sharpen	10d	60 b	99 a	42 c	35 de	99 a	67 c
Sharpen	3d	100 a	99 a	87 a	99 ab	100 a	92 b
LSD P=0.05		6.89			7.50		
Std. Dev.		4.99			5.43		
CV		13.27			15.27		

Values followed by the same letter within sampling dates are not significantly different.

Snap bean stand counts in Delaware 5 WAP were similar for the untreated check and both timings of Liberty application. Stand count was significantly lower for Elevore and Sharpen compared to the untreated check. In addition, weight per plant was similar for both Liberty timings and the untreated check.

In New York, stand counts at harvest and yield were not significantly different from the untreated check except Sharpen applied 3 days before planting (note Elevore was not included at the NY site).

Lima beans in Delaware responded similarly to snap beans for all the treatments.

Summary and Outreach

Liberty maybe an option for preplant herbicide applications in snap beans, provided there is a delay between application and planting. In this trial, a 10 day delay resulted in little to no observable injury. Applications only 3 days before planting resulted in at least 10% injury in two of the three locations, and stunting was observed for at least three weeks after planting. Additional research should identify if 5 to 7 days was provide sufficient crop safety.

Future research should include a longer waiting period after application of Elevore. Ten days resulted in much less injury than 3 days, but the average was over 10% injury. Sharpen was too injurious for use in snap bean without a much longer delay between application and planting.

This data has been shared with USDA IR-4 Project, which focuses on registering pesticides for specialty crops and BASF, the manufacturer of Liberty. Information has been discussed at the Delaware Ag Week (annual research and extension update for farmers) and the 2022 Mid-Atlantic Fruit and Vegetable Convention.

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

VEGETABLE PRODUCTION

Evaluation of Atrazine Alternatives for Postemergence Weed Control in Sweet Corn

John Wallace, Dwight Lingenfelter, Mark VanGessel and Lynn Sosnoskie

Postemergence applications of HPPD-inhibiting herbicides (Group 27; i.e., Callisto, Impact, Laudis) are commonly used to control broadleaf and some annual grass weeds in sweet corn production. Tank mixing these herbicides with atrazine is commonly recommended because previous research has demonstrated improved weed control efficacy of certain species and a greater weed control spectrum compared to using HPPD-inhibiting herbicides alone. Atrazine remains a key component to sweet corn weed management programs due to its low cost and control efficacy. However, rotational restrictions following atrazine use (up to 24 month rotation interval) limits its use in diverse rotations, preventing the flexibility in crop rotation management that is often necessary to fulfill processing vegetable contracts. In addition, there is growing concern over increased restrictions on atrazine use due to contamination of water supplies, which has led to increased interest in finding alternatives to atrazine for weed control in corn. Preliminary field crop research conducted in other regions suggest that herbicides with the same mode action as atrazine can also increase the efficacy of HPPD-inhibiting herbicides. These alternative herbicides include Basagran (labeled in sweet corn) and Maestro/Buctril (field corn only). Preliminary research suggests that Starane Ultra (labeled in sweet corn) can

also synergize HPPD inhibiting herbicides. Each of these atrazine alternatives have shorter rotation restrictions than atrazine (**Table 1**).

The objective of this study was to compare the weed control efficacy of key postemergence HPPD-inhibiting herbicides (Group 27) applied alone or in combination with atrazine, Basagran, Maestro or Starane Ultra to determine if these potential atrazine alternatives can produce similar levels of weed control.

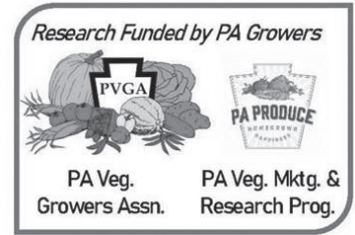


Table 1. Sample of crop rotation intervals for atrazine and potential alternatives.

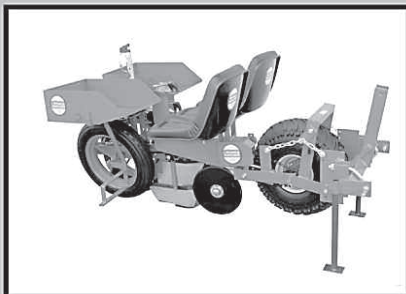
Rotational Interval to Crop Planting (months)						
Herbicide	Snap Bean	Cabbage	Tomato	Pumpkins	Cucumber	Cereal
Atrazine	24	24	24	24	24	24
Basagran	0	0	0	0	0	0
Maestro	1	1	1	1	1	1
Starane Ultra	4	4	4	4	4	0

Materials & Methods

Field trials were conducted in the 2021 growing season at three locations (Georgetown DE, Rock Springs PA, Geneva NY). Herbicide treatments (Table 2) were imposed in a randomized

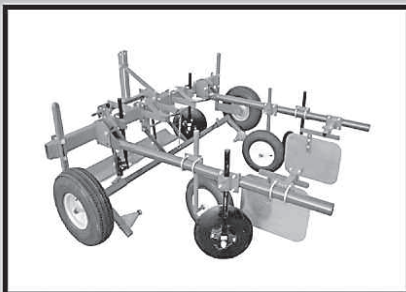
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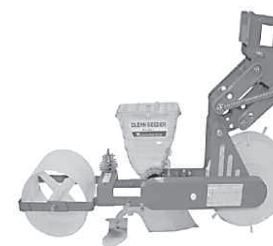
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VEGETABLE PRODUCTION

Evaluation of Atrazine Alternatives

continued from page 9

complete block design with three replications. The plots were four rows by 25 feet long and a representative sweet corn variety was used at each location. Standard tillage and seed bed preparation was used followed by an application of a set-up pre-emergence herbicide program (Dual II Mag) across the study site within 2 days of planting. Postemergence herbicide treatments were applied at the V3 crop growth stage. Weed control and crop injury was visually evaluated 2 and 4 weeks after application of post-emergence herbicide treatments and just prior to harvest.

Table 2. Herbicide treatments

Trt No.	HPPD (Group 27)	Product Rate	Tank Mix	Product Rate
1	Callisto	3 oz/ac	----	----
2	Callisto	3 oz/ac	Atrazine	1 pt/ac
3	Callisto	3 oz/ac	Basagran	2 pt/ac
4	Callisto	3 oz/ac	Maestro	1.5 pt/ac
5	Callisto	3 oz/ac	Starane Ultra	0.4 pt/ac
6	Impact	0.75 oz/ac	----	----
7	Impact	0.75 oz/ac	Atrazine	1 pt/ac
8	Impact	0.75 oz/ac	Basagran	2 pt/ac
9	Impact	0.75 oz/ac	Maestro	1.5 pt/ac
10	Impact	0.75 oz/ac	Starane Ultra	0.4 pt/ac
11	Untreated	----	Atrazine	1 pt/ac
12	Untreated	----	Untreated	----

Results

Replicated field trials across multiple Mid-Atlantic locations allowed for assessment of herbicide efficacy on different weed species.

At the Delaware location, herbicide treatments did not affect Palmer amaranth control 49 days after application (DAA), with control levels ranging between 85 and 99%. Callistobased treatments resulted in higher levels of annual morningglory control 49 DAA compared to Impact-based treatments (Table 3). Tank-mixing Starane Ultra or Basagran with Callisto resulted in Palmer amaranth and annual morningglory control levels comparable to the Callisto and atrazine tank-mix. Use of Maestro as the tank-mix partner with Callisto resulted in significantly lower annual morningglory control 49 DAA. However, use of Maestro as a tank-mix partner with Impact resulted in significantly greater annual morningglory control compared to Impact alone, with atrazine, or with Basagran. Sweet corn injury was minimal across herbicide treatments.

Table 3. HCrop injury and weed control in response to herbicide treatments in 2021 experiment located in Georgetown, DE. Means followed by same letter are not significantly different ($P > 0.05$). DAA = days after application; NS = non-significant.

Treatment	Crop response 35 DAA	Palmer amaranth 49 DAA	Annual morning glory 49 DAA
	% injury	% control	% control
Callisto	3	85	96 a
Callisto + atrazine	10	99	99 a
Callisto + Basagran	0	94	99 a

Treatment	Crop response 35 DAA	Palmer amaranth 49 DAA	Annual morning glory 49 DAA
	% injury	% control	% control
Callisto + Maestro	2	93	66 b
Callisto + Starane Ultra	2	91	94 a
Impact	0	81	36 c
Impact + atrazine	3	89	70 b
Impact + Basagran	4	85	36 c
Impact + Maestro	0	99	93 a
Impact + Starane Ultra	3	88	83 ab
atrazine	4	92	96 a

P-value NS NS < 0.001

At the Pennsylvania location, all herbicide combinations resulted in high levels (> 90%) of common lambsquarters and redroot pigweed control 30 DAA (Table 4). Though not significantly different, higher levels of weed control were observed in Callisto-based treatments compared to Impact-based treatments both 30 and 60 DAA. Using tank-mix partners with Impact generally increased common lambsquarters control compared to use of Impact alone. Moderate levels of sweet corn injury (7 - 15%) were observed 30 DAA in treatments that used Maestro or Starane Ultra in combination with Callisto or Impact.

Table 4. Crop injury and weed control in response to herbicide treatments in 2021 experiment located in Rock Springs, PA. Means followed by same letter are not significantly different ($P > 0.05$). DAA = days after application; NS = non-significant.

Treatment	Crop Response 30 DAA	Common lambs quarters		Redroot pigweed	
		30 DAA	60 DAA	30 DAA	60 DAA
Callisto	3	99	99	99	99
Callisto + atrazine	2	99	99	99	99
Callisto + Basagran	5	99	99	99	99
Callisto + Maestro	7	99	99	99	99
Callisto + Starane Ultra	15	99	99	99	99
Impact	3	86	81	97	96
Impact + atrazine	2	99	93	99	99
Impact + Basagran	5	96	91	96	91
Impact + Maestro	10	99	99	99	99
Impact + Starane Ultra	12	99	93	99	99
atrazine	2	90	85	87	83

At the New York location, high levels of weed control (> 90%) were observed across herbicide treatments (Table 5). However, significant sweet corn injury (> 30%) was observed 35 DAA when Maestro was used in combination with either HPPD herbicide, as well as the combination of Callisto + Basagran. Field observations suggested that significant rainfall followed by soil water exceeding field capacity close to the time of POST herbicide applications likely contributed to enhanced and prolonged sweet corn injury to these treatments.

VEGETABLE PRODUCTION

Table 5. Crop injury and weed control in response to herbicide treatments in 2021 experiment located in Geneva, NY. Means followed by same letter are not significantly different ($P > 0.05$). DAA = days after application; NS = non-significant.

Treatment	Crop response	Total weed control
	30 DAA	30 DAA
	% injury	% control
Callisto	6	99
Callisto + atrazine	6	99
Callisto + Basagran	35	99
Callisto + Maestro	48	99
Callisto + Starane Ultra	---	---
Impact	5	99
Impact + atrazine	3	99
Impact + Basagran	8	99
Impact + Maestro	31	99
Impact + Starane Ultra	---	---
atrazine	0	99

Summary & Conclusions

Study results suggest that Basagran, Maestro and Starane Ultra can be suitable replacements for atrazine as a tank-mix partner with HPPD herbicides for postemergence control of small seeded broadleaf weeds like pigweeds and lambsquarters. However, variable control levels were observed on annual morningglory, which is a larger seeded species. Additional field trials should be considered to evaluate these treatment combinations on other problematic weed species in the region. Significant crop injury was observed in Basagran and Maestro treatments at one location, though environmental conditions may have exacerbated the magnitude and length of crop injury. Additional field-level evaluations should be considered to develop non-atrazine tank-mix programs for use of HPPD herbicides in sweet corn production systems.

Dr. Wallace and Mr. Lingenfelter are with Penn State, Dr. VanGessel is with the Univ. of Delaware and Dr. Sosnoskie is with Cornell Univ. This research was funded by PVGA and the Pennsylvania Vegetable Marketing and Research Program.



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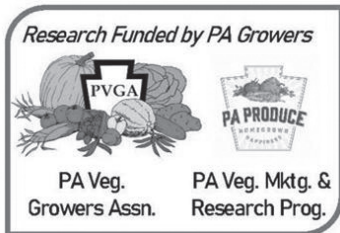


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VEGETABLE PRODUCTION

Overlapping Dual Magnum Programs for Weed Control in No-Till Pumpkin

Kurt M. Vollmer, Dwight D. Lingenfelter, Kelly Nichols John M. Wallace



Weed control in pumpkins is challenging for many reasons, including the production practices of wide rows, no-till (which excludes use of cultivation), a long growing season and limited number of herbicide options. These practices result in a greater reliance on herbicides for weed control.

Unfortunately, few herbicides labeled for postemergence weed control in pumpkin, and even fewer are available to control herbicide-resistant species such as Palmer amaranth and common waterhemp. Therefore, novel uses of soil-applied herbicides should continue to be explored. One approach to improve overall weed control is to apply a second residual herbicide over the top of the emerged crop, but before the weeds have begun to emerge. This approach is referred to as overlapping residuals.

Dual Magnum (S-metolachlor) is a common residual herbicide labeled for numerous crops, but not labeled preemergence in pumpkins (note, Dual Magnum is only labeled for between pumpkin row applications, not as a broadcast spray). Previous studies have demonstrated good crop safety when using Dual Magnum as overlapping residual treatments on pumpkin. However, the effects of this approach on weed control have been inconsistent

due to a lack of weed emergence and/or a lack of weed crop interaction and warrant further investigation.

Objectives

Evaluate crop safety and weed control potential of Dual Magnum or Dual Magnum + Select Max as an overlapping residual approach for pumpkin production throughout the Mid-Atlantic Region.

Procedures

The study evaluated pumpkin ('Gladiator') response and weed control efficacy to Dual Magnum applied as a broadcast postemergence treatment. Curbit (ethalfluralin) was applied within 1 day of planting to all treatments; in addition, a single preemergence treatment of Curbit + Reflex (fomesafen) was also included (Table 1). Dual Magnum was applied at 2 or 4 weeks after planting (WAP) at a 1X (0.75 pt/A) or 2X (1.5 pt/A) rate alone or in tank mixtures with Select Max. Untreated control and weed free treatments were also included for comparison. All treatments had at least three replications. Plots treated with Curbit only were monitored weekly starting two weeks after planting to document the emergence pattern of key weeds. All plots were evaluated visually for weed control and pumpkin response. Fungicides and insecticides were applied as needed.

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Table 1. HCrop injury and weed control in response to herbicide treatments in 2021 experiment located in Georgetown, DE. Means followed by same letter are not significantly different ($P > 0.05$). DAA = days after application; NS = non-significant.

Trt. No.	Treatment Name	Rate	Unit	Timing*
1	Untreated			
2	Curbit	48	fl oz/A	PRE
3	Curbit Dual Magnum	48 0.75	fl oz/A pt/A	PRE 2 WAP
4	Curbit Dual Magnum	48 0.75	fl oz/A pt/A	PRE 4 WAP
5	Curbit Dual Magnum	48 1.5	fl oz/A pt/A	PRE 2 WAP
6	Curbit Dual Magnum	48 1.5	fl oz/A pt/A	PRE 4 WAP
7	Curbit Dual Magnum Select Max	48 .75 16	fl oz/A pt/A fl oz/A	PRE 2 WAP 2 WAP
8	Curbit Dual Magnum Select Max	48 .75 16	fl oz/A pt/A fl oz/A	PRE 4 WAP 4 WAP
9	Curbit Dual Magnum Select Max	48 .75 16	fl oz/A pt/A fl oz/A	PRE 2 WAP 2 WAP
10	Curbit Dual Magnum Select Max	48 .75 16	fl oz/A pt/A fl oz/A	PRE 4 WAP 4 WAP
11	Curbit Reflex	48 1.5	fl oz/A pt/A	PRE PRE
12	Weed Free			

To obtain a wider range of weeds this study was conducted at the Western Maryland Research and Education Center in Keedysville, MD; the Wye Research and Education Center in Queenstown, MD; the Russel E. Lawson Agricultural Research Center in Rock Springs, PA; and the University of Delaware Carvel Research and Education Center in Georgetown, DE. This research will benefit state and regional pumpkin growers by improving knowledge on how to extend residual weeds control with effective herbicide modes-of-action and reduce the potential for herbicide resistance. Data generated by this research will also allow the potential to petition for special local needs (24c) labels for POST broadcast applications in pumpkin.

Results

- Due to emergence issues, accurate data could not be collected at the Rock Springs, PA site.
- Pumpkins did not show injury response from broadcast applications of Dual Magnum or Dual Magnum + Select Max at any of the application rates or timings.
- There were no differences in visual weed control among treatments at the Keedysville, MD site.
- Smooth pigweed and Palmer amaranth control tended to be greater when Dual Magnum was applied 2 WAP rather than 4 WAP (Figure 1).
- POST Dual Magnum treatments controlled fall panicum greater than Curbit alone, but including Select Max improved control (Figure1)
- Yield differed by location, and consistent patterns among herbicide treatments were not apparent (Figure 2).
- Our results continue to demonstrate that Dual Magnum does not cause any adverse crop injury when applied as a broadcast treatment in pumpkin.
- While this tactic was effective in providing residual weed control later in the growing season, other tactics are still needed to control emerged weeds.
- Data from this study will be compiled with that of previous and future studies in hopes of receiving a label for this utility.

Continued on page 14

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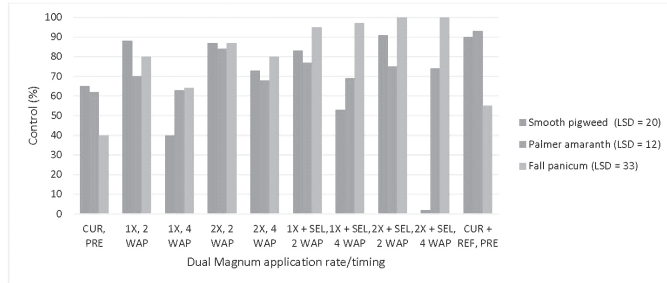
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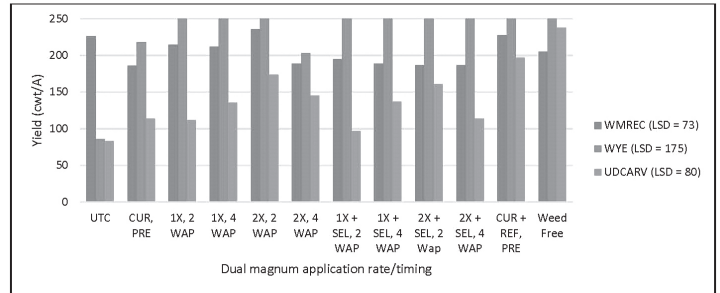
VEGETABLE PRODUCTION

Overlapping Dual Magnum Programs *continued from page 13*

Figure 1. Smooth pigweed, Palmer amaranth, and fall panicum control 7 weeks after planting.



* All treatments include an application of Curbit (48 oz/A) after planting.
 * Abbreviations: CUR, Curbit; REF, Reflex
 * The 1X and 2X rates of Dual Magnum correspond application rates of 0.75 pt/A and 1.5 pt/A, respectively.



* All treatments include an application of Curbit (48 oz/A) after planting.
 * Abbreviations: CUR, Curbit; REF, Reflex, UTC, untreated check; WMREC, Western Maryland Research and Education Center; WYE, Wye Research and Education Center; UDCARV, UD Carvel Research and Education Center.
 * The 1X and 2X rates of Dual Magnum correspond application rates of 0.75 pt/A and 1.5 pt/A, respectively.

Figure 2. Marketable pumpkin yield in 2020.

Special thanks to Mark VanGessel and Barb Scott, at the Univ. of Delaware, for providing an additional location and conducting these trials. Mr. Vollmer and Ms. Nichols are with the Univ. of Maryland Extension, and Mr. Lingenfelter and Dr. Wallace are with Penn State. This project was funded by PVGA and the Pennsylvania Vegetable Marketing and Research Program.

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VEGETABLE PRODUCTION

Shade Cloth for Bell Peppers

Emmalea Ernest

Over the past four years I have been testing the practice of using shade cloth in bell pepper production. Shade cloth is a knitted, weather resistant fabric that can be used to block a portion of the sunlight that would otherwise reach plants. It is commonly used in greenhouse and nursery plant production and could be useful in preventing heat stress in some vegetables. Different colors and levels of shade are available. For vegetables, shade cloth that blocks 30% of the sunlight is typically recommended.

In 2018 and 2019, I tested different colors of shade cloth for green bell pepper production on drip irrigated black plastic mulch.



E Ernest, University of Delaware

Figure 1. In the 2019 trial an unshaded plot (foreground) with poor plant growth and fruit sizing compared to a shaded plot (background).

In those trials, the 30% black shade cloth treatment produced the highest yields and increased marketable yield to three times the marketable yield of no shade cloth (Fig. 1). Shade cloth did not increase the number of peppers produced, rather it increased pepper fruit size and marketability. Shade cloth can prevent heat stress induced quality defects like sunscald and reduces plant heat stress, resulting in larger fruit. In these trials black shade cloth produced significantly higher marketable weight than the other shade cloth colors (white, red and aluminized).

In the 2018 and 2019 trials the peppers were transplanted in early June and the shade cloth was applied in early July, after the plants had been staked and tied once. Trials conducted in 2020 and 2021 showed a benefit to applying shade immediately after transplanting in early June. Earlier shading protects young plants from girdling that can result from heat damage to the stem soon after transplanting and help transplants to establish successfully (Fig 2).



E Ernest, University of Delaware

Figure 2. Transplant with stem girdling from heat damage soon after transplanting

Earlier shading protects young plants from girdling that can result from heat damage to the stem soon after transplanting and help transplants to establish successfully (Fig 2).

Continued on page 16

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VEGETABLE PRODUCTION

Shade Cloth for Bell Peppers *continued from page 15*

In the 2021 trial three colored bell varieties (Early Sunsatation, Mandarin Perfection, Aristotle) and a sweet Italian variety (Carmen) were used. The bell pepper varieties all had significantly higher yields with shade, but Carmen did not have a significant yield increase from shade, indicating that this variety may be more heat tolerant than the bell pepper varieties. One goal of the 2021 trial was to determine the best timing for shade cloth use in peppers. The treatments with the highest marketable yield were those with shade cloth in both June and July, as opposed to only June or only July. Keeping the shade cloth on for the first two weeks of August increased marketable yield slightly over the June & July shade treatment.

In the 2021 trial I used data loggers to measure air temperatures in the leaf canopy of shaded and unshaded peppers throughout July (Figure 3). Average daily temperatures were 2 °F cooler in the shaded plants. Differences in maximum daily temperatures were even larger, with the shaded plants having, on average, 8 °F lower maximum temperatures. The reduction of maximum temperatures may be especially important in avoiding plant stress and fruit damage from sunscald.

You may be wondering how best to implement shade cloth on your farm. Shade cloth is durable and can be reused for many years. In the experiments described the shade cloth was draped over the pepper stakes and secured to the ground with landscape staples or aluminum tent stakes. Shade cloth can also be applied over low tunnels or larger structures to create “shade houses”. Shade cloth might also benefit high tunnel grown peppers during the hottest months. In my trials we did not remove the shade cloth for sprays and did not notice differences in disease incidence between shaded and unshaded plots. Unless used with a large structure, shade cloth will have to be moved to access plants for harvest.

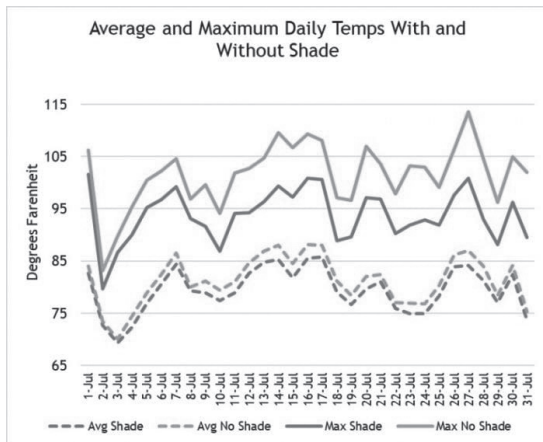


Figure 3. Daily average and maximum temperatures in the plant canopy of shaded and unshaded pepper plants in July 2021

I am repeating the 2021 shade cloth timing study this summer. It was planted on June 1 and already there are noticeable differences with less stem girdling from heat stress in shaded plots. With what is likely to be a hot summer ahead I will be interested to see whether shade cloth continues to be a useful tool and think about how it can be efficiently implemented on farms.

Ms. Ernest is with the Extension Vegetable and Fruit Program at the Univ. of Delaware. From the Weekly Crop Update, Univ. of Delaware Extension, Vol. 30, Issue 12, June 10, 2022

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2022 Summer Grower Educational Opportunities *continued from page 4*

Pennsylvania Vegetable IPM Weekly Update

PVGA also publishes its own monthly newsletter – this is coThe PA Vegetable Marketing and Research Program offers growers the PA Vegetable IPM Weekly Update available by email, fax or regular mail. These Updates contain current sweet corn, tomato, cucurbit, berry and general integrated pest management (IPM) information from Penn State Extension specialists throughout the season until early September. To request these Updates, email the Program at pvmrp@embarqmail.com or call 717-694-3596 as soon as possible to get on the list for the weekly mailings, faxes or emails. Please note that faxes will normally be sent during the nighttime hours. These Updates are also posted on the [PAVeggies.org](https://www.paveggies.org/farmers/ipm-weekly-updates/) website at <https://www.paveggies.org/farmers/ipm-weekly-updates/>.

1-800-PENN-IPM Hotline

Penn State Extension’s 1-800 PENN IPM hotline continues to provide the horticultural and agricultural community with updated information throughout the season.

Callers can select from a number of integrated pest management and cultural practices topics. This is a toll-free service offered by Penn State specialists and educators with messages updated on a regular seasonal basis. See further information on navigating the new hotline on the bottom of this page.

Marrone Bio Weekly Teleconferences

Every Wednesday, at 12:30 pm EST, Steve Bogash of Marrone Bio Innovations is hosting a second season of weekly pest management education teleconferences. These calls are for growers, retailers and crop consultants. The calls will last 30 minutes and will begin at 12:30 PM EST. The first 15 minutes will be reports on seasonal and active pest management challenges in vegetables and small fruit with a guest expert. Then, the call is opened to discussion and Q & A. The calls are recorded and accessible thru the playback number below.

Call-In Number: 681-999-0224 - Access Code: 832191

Playback Number: 757-841-1091 – Access Code: 832191. All of the 2020 and 2021 recordings along with the 2022 recordings to date are available. For a directory of the reference numbers, contact Steve Bogash at 717-877-7105 or sbogash@marronebio.com.

HOW TO NAVIGATE THE NEW 1-800-PENN-IPM

Subject	Keys	Description
Vegetables	1	Updates for commercial vegetable production
General	1	Messages applicable to general vegetable production
Onion and Allium	2	Specific to allium production
Tomatoes and Potatoes	3	Specific to tomato/potato production
Sweet Corn	4	Sweet corn pest updates
Vine Crops	5	Pumpkins, squash, other cucurbits and vines
Previous Menu	*	Return to the previous menu
Greenhouse IPM	2	Updates for commercial greenhouse IPM
Coronavirus Tips	3	Coronavirus updates for produce growers
Small Fruit	4	Commercial small fruit production (all kinds)
Tree Fruit	6	Commercial tree fruit industry main menu
Pathology	1	Pathology updates (diseases)
Entomology	2	Entomology updates (insects and mites)
Physiology/Horticulture	3	Physiology, pomology, and horticulture updates
General	4	Current tree fruit industry issues
Directory	8	A brief directory of specialist and educator contact numbers
FREC	0	Transfer to the Fruit Research and Extension Center (FREC)
Previous Menu	*	Return to the previous menu
Private Applicator License Update	8	Information about the PDA pesticide applicator license process
Spanish-Language Translations (Traducciones al Idioma Español)	9	Updates in Spanish (Actualizaciones en Español)
Vegetables (Hortalizas)	1	General vegetable production (Producción de hortalizas)
Greenhouse IPM (MIP de invernadero)	2	Greenhouse growing (Producción en invernaderos)
Small Fruit (Frutas pequeñas)	3	General small fruit production (Producción de frutas pequeñas)
Tree Fruit (Árboles Frutales)	4	General tree fruit production (Producción de árboles frutales)
Previous Menu (Menú anterior)	*	Return to the previous menu (Retornar al menú anterior)



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VEGETABLE PRODUCTION

Preparing for Cucurbit Downy Mildew in 2022

Andrew Wyenandt

Cucurbit downy mildew (CDM) was reported on cucumber in southern New Jersey on June 11 and in Lancaster County, PA on June 23. These are the first two reports of CDM in the region to date. All cucumber and cantaloupe growers should be scouting on a daily basis and initiating preventative fungicide programs. For a review of CDM and its control please see below.

In 2004, cucurbit downy mildew re-emerged in the US with a vengeance causing significant losses in cucurbit production. In most years prior to this, concern for CDM control was minimal, since the pathogen arrived late in the growing season (in more northern regions), or the pathogen caused little damage, or never appeared. After 2004, with significant losses at stake, and with very few fungicides labeled for its proper control, CDM became a serious threat to cucurbit production. Importantly, at the time, cucumber varieties with very good levels of CDM resistance were no longer resistant, suggesting a major shift in the pathogen population. Research done over the past 15 years has led to a better understanding of the pathogen. Recent research has determined that the CDM falls into two separate clades: Clade I and Clade II.

Some CDM (*Pseudoperonospora cubensis*) isolates fall into Clade I which predominately infect watermelon, pumpkin, and squash, where CDM isolates in Clade II predominately infect cucumber and cantaloupe. Research suggests that isolates in Clade II can quickly become resistant to specific fungicides (NCSU). Most cucumber varieties are resistant to Clade 1 isolates, but there is no resistance currently available for Clade 2 isolates. For pickling cucumber the varieties, Citadel and Peacemaker, are tolerant to clade 2 isolates. For slicing cucumbers, the varieties SV3462CS and SV-4142CL are tolerant to Clade 2 isolates. All organic and greenhouse growers are encouraged to use tolerant varieties since chemical control options are very limited (NCSU). An extended list of cucumber varieties with CDM resistance from the University of Florida can

be found at <https://edis.ifas.ufl.edu/pp325>.

For the past decade, researchers from around the US have been closely monitoring and forecasting the progress of CDM through a website hosted by NCSU. The CDMpipe website is currently in the process of an upgrade and will now be hosted by Penn State University. All cucurbit growers are encouraged to sign up to the CDMpipe website at <https://cdm.ipmpipe.org/> to help them know what cucurbit crops are being infected (and where) and to follow the forecasting to know where the pathogen may move to next. As a note, in recent years, CDM control with certain fungicides has varied significantly depending on the cucurbit host and geographic region. This is extremely important since two clades of the pathogen are potentially present (affecting host range) as well as having a potential impact on control strategies. How do you know which clade may be present on your farm? Follow the reports. If CDM is mostly present in cucumber crops as it works its way up the east coast, then you are most likely to see it infect cucumber and cantaloupe on your farm first. Scout your fields regularly, especially if CDM is in the immediate region. Pay very close attention to symptom development and on what cucurbit crop(s) you see it on, this is especially important if you grow more than one cucurbit crop. Like cucurbit powdery mildew, once CDM arrives in the region preventative fungicide applications are necessary.

Fungicides for CDM control

Loss of efficacy in the control of CDM has also been documented in FRAC code 4 (mefenoxam), FRAC code 11 fungicides (azoxystrobin), FRAC code 28 (propamocarb HCL), and FRAC code 43 (fluopicolide) in the mid-Atlantic region and elsewhere. Insensitivity to fluopicolide (43) and propamocarb HCL (28) have been reported in multiple states (Thomas et al., 2018). In some

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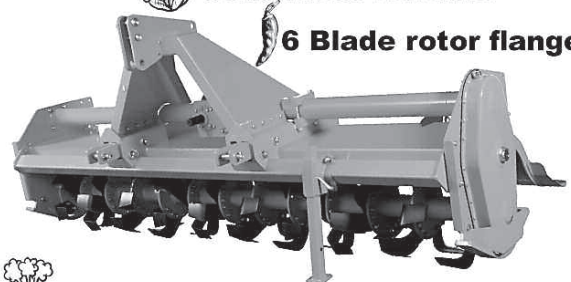


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VEGETABLE PRODUCTION

cases, individual isolates of CDM were insensitive to both chemistries. Recent research in Michigan in a three year field study using pickling cucumber determined that cyazofamid (21), (ametoctradin, 45 + dimethomorph, 40), (zoxamide, 22 + mancozeb, M03), mancozeb (M03); chlorothalonil (M05), and oxathiapiprolin (49) alone or in a premix provided the best level of control (Goldenhart & Hausbeck, 2019). In a recent study evaluating different fungicide chemistries in field trials done in different states (OH, NY, & SC) determined that propamocarb HCL (28), cymoxanil + famoxadone (27 + 11), and fluopicolide (43) were ineffective in 1 or 2 states during both years of the trial (Keinath, Miller, & Smart, 2019). In one year of the study, famoxadone (11), dimethomorph (40), cymoxanil (21), and mancozeb (M03) were ineffective for CDM control (Keinath, Miller, & Smart, 2019). In bioassay studies done during this trial, cyazofamid (21), oxathiapiprolin (49) suppressed CDM >80%.

Most fungicides labeled for the control of CDM are at-risk for resistance development because of the specific modes of action. These include Ranman (cyazofamid, FRAC code 21), Gavel (zoxamide, 22 + mancozeb, M03), Zing! (zoxamide, 22 + chlorothalonil, M05); Curzate (cymoxanil, 27), Previcur Flex (propamocarb HCL, 28), Forum/Revus (dimethomorph, 40), Zampro (ametoctradin, 45 + dimethomorph, 40), Orondis Opti (oxathiapiprolin, 49 + chlorothalonil, M05), and Orondis Ultra (oxathiapiprolin, 49 + mandipropamid, 40). Importantly, just like with cucurbit powdery mildew control, there are a number of CDM fungicides with different modes of action from different FRAC codes to choose from. As noted in the paragraph above, the efficacy of individual fungicide chemistries may vary significantly by state or region. Thus, growers need to scout their cucurbit fields on a weekly basis, note the efficacy, or lack thereof, they are seeing in the field, and incorporate the use of as many different FRAC groups as possible to help mitigate fungicide resistance development.

Fungicide programs for CDM control

An example of a fungicide program for CDM control in the

mid-Atlantic region might look like this, where a CDM specific fungicide from a different FRAC group is used on weekly basis:

A – B – C – D – E

where A= Gavel (zoxamide, 22 + mancozeb, M03); B= Orondis Opti (oxathiapiprolin, 49 + chlorothalonil, M05); C= Ranman (cyazofamid, FRAC code 21); D= Orondis Ultra (oxathiapiprolin, 49 + mandipropamid, 40); E= Curzate (cymoxanil, 27)

Not all of the fungicides listed above are labeled for all cucurbit crops. Some fungicides, such as the Orondis products have limited number of applications. Growers will need to refer to local recommendations and the label for crop specifics. Remember, the label is the law.

A protectant fungicide such as chlorothalonil or mancozeb should be added (if not already included) to the tank mix with each high-risk fungicide to reduce selection pressure and to help control other important diseases such as anthracnose and plectosporium blight. All growers should follow use recommendations on labels and avoid overusing one mode of action, even if it works well. If loss of efficacy is present, the grower should avoid using that particular fungicide (FRAC group) for CDM control the rest of the growing season.

Growers should remember that fungicides specifically labeled for CDM control won't control CPM, and fungicides labeled for CPM control won't control CDM. Therefore, carefully following the disease monitoring and forecasting website, choosing varieties with CDM resistance, paying close attention to host crops, scouting fields on a regular basis, noting fungicide efficacy, and following proper fungicide resistant management guidelines remain critically important for successful CDM control.

For more information on the specific fungicides recommended for CDM control on cucurbit crops please see the 2022/2023 Mid-Atlantic Commercial Vegetable Production Recommendations.

Dr. Wyenandt is vegetable pathologist with Rutgers Coop. Extension. From the Plant and Pest Advisory, Rutgers Coop. Ext., <https://plant-pest-advisory.rutgers.edu/the-abcs-of-cucurbit-downy-mildew-control-2-2-2/>, June 25, 2022

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BERRY PRODUCTION

Identifying and Controlling Common Leaf Spot in Strawberry

Andrew Wyenandt

Strawberry leaf spot, caused by the soil-borne fungal pathogen, *Mycosphaerella fragariae*, can infect leaves, petioles, runners, fruit stalks (pedicels), and berry caps or calyxes. Small, dark purple to reddish-purple, round spots, 1/8 to 1/4 inch in diameter (3 to 6 millimeters), appear on the upper leaf surfaces. The center of the spots soon become tan or gray and eventually almost white, while the broad margins remain dark purple. Later in the season, dark specks (sclerotia and/or perithecia) may be seen in the older lesions. Tannish areas form on the undersides of infected leaves. The symptoms on the other plant parts, except the fruit, are almost identical to those that develop on the upper leaf surface.



Strawberry leaf spot on infected leaves.

Microsclerotia and conidia from infected leaves that survive the winter can lead to infections of new growth in the spring. The period between infection and the appearance of lesions on the upper leaf surface can range from 10 to 14 days depending on weather conditions. Large numbers of conidia can cause second-

Symptoms of strawberry leaf spot on infected leaf petioles.



ary infections during prolonged periods of damp to wet, moderately warm weather. Temperatures between 65 and 75 F (18 to 24 C) are optimal for the growth of fungus and for lesion development. Infections can continue to occur throughout the growing season. Young, expanding leaves are much more susceptible to infection than mature leaves. If frequent rains occur during early and mid-spring, a few infection sites can start an epidemic.

Control of strawberry leaf spot begins with recognizing symptoms and preventative fungicide applications. All strawberry fields need to be scouted on a regular basis. Especially, during periods of wet weather or during heavy use of overhead irrigation. Weekly applications rotating the following should be done as long as symptoms are present and weather conducive for disease development persists. For more information please see the 2022/2023 Mid-Atlantic Commercial Vegetable Recommendations Guide. Fungicide applications for strawberry leaf spot will be effective for strawberry leaf scorch and strawberry leaf blight.

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BERRY PRODUCTION

Code	Product Name	Product Rate	Active Ingredient(s) (*=Restricted Use)	PHI (d)	REI (h)	Bee TR
M04	Captan 50W	6.0 lb/A	captan	0	24	N
M04	Captan 80WDG	3.7 lb/A	captan	0	24	N
M04	Captan 4L	3.0 qt/A	captan	0	24	N
M04+17	Captevate 68WDG1	3.5 to 5.25 lb/A	captan + fenhexamid	0	24	N
Do not apply the same FRAC code more than twice in a row or in a season.						
1	Topsin M	1.0 lb/A	thiophanate-methyl	1	24	N
2	Meteor2	1.5 to 2.0 pt/A	iprodione	n/a	24	N
2	Nevado 4F2	1.5 to 2.0 pt/A	iprodione	n/a	24	N
2	Rovral 4F2	1.5 to 2.0 pt/A	iprodione	n/a	24	N
3	Rally 40WSP	2.5 to 5.0 oz/A	myclobutanil	0	24	N
11	Cabrio 20EG	12 to 14 oz/A	pyraclostrobin	0	12	N
3 + 11	Quadris Top 1.67SC	12 to 14 fl oz/A	difenoconazole + azoxystrobin	0	12	—
3 + 11	Quilt Xcel 2.2SE	14 fl oz/A	propiconazole + azoxystrobin	0	12	N
7 + 11	Merivon 2.09SC	4 to 7 fl oz/A	fluxapyroxad + pyraclostrobin	0	12	N
7 + 11	Pristine 38WG	18.5 to 23.0 oz/A	boscalid + pyraclostrobin	0	12	—

For organic strawberry growers, weekly applications of an OMRI-approved copper or potassium bicarbonate have been shown to be effective in mitigating strawberry leaf spot. Please

see link to MSU's fungicide efficacy table for organic and conventional fungicide use.

Continued on page 22

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BERRY PRODUCTION

Common Leaf Spot in Strawberry

continued from page 21

Additional Information

For more information on Neopestalotiopsis see <https://plant-pest-advisory.rutgers.edu/neopestalotiopsis-something-to-scout-for-in-fall-transplanted-strawberry>.

For information on controlling angular leaf spot in strawberry see <https://plant-pest-advisory.rutgers.edu/angular-leaf-spot-in-strawberries-2/>.

For information on controlling fruit rots in strawberry <https://plant-pest-advisory.rutgers.edu/controlling-strawberry-fruit-rots-2017-2-2-2/>.

For more information on strawberry leaf spot please see the following:
<http://ipm.illinois.edu/diseases/series700/rpd702/index.html>
<https://hort.extension.wisc.edu/articles/common-leaf-spot-of-strawberry/>

Michigan State University, 2015 – Information on diseases and fungicide efficacy – <https://www.canr.msu.edu/news/protect-strawberries-from-foliar-diseases-after-renovation>

Cornell University, 2013 – Information on diseases and fungicide efficacy – <https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/0/7265/files/2017/01/strleafdisidmgmt-yjcu5n.pdf>

Please remember, the label is the law!

Dr. Wyenandt is the Vegetable Pathologist at Rutgers Coop. Extension. From the **Plant and Pest Advisory**, Rutgers Coop. Extension, 2 <https://plant-pest-advisory.rutgers.edu/identifying-and-controlling-strawberry-leaf-spot-2-2/>, June 21, 2022.

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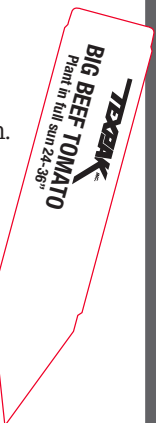
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