

**CFAES**

OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER  
OHIO STATE UNIVERSITY EXTENSION

# CONNECTIONS

WINTER 2018-19

OSU SOUTH CENTERS



## WATCH THIS!

Video is growing and poised to play a big role in the future

**By Bradford Sherman**  
CFAES/OSU South Centers

For a glimpse of what the future of our educational programming might look like – watch this.

Use of video as a medium for transmitting information has been expanding at The Ohio State University South Centers. Following its largest ever period of growth in 2018, and with ambitious plans in the works, 2019 looks poised to be the best year yet for video.

See *VIDEO* Page 2

*LEFT: Patrick Dengel oversees video production at OSU South Centers, and a collaboration with the University of Rio Grande.  
(Photo: Bradford Sherman/CFAES)*

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## VIDEO from Front

What's more, utilizing video technology is a key part of the South Centers strategic plan for how programming will be delivered to stakeholders, partners, and residents – and thus an even greater emphasis will be placed on it moving forward.

“Our future is in multi-channel programming,” stated Dr. Thomas Worley, Director at OSU South Centers. “Whether it be through local access cable networks, YouTube, webinars, or what have you – all are viable means of broadening the reach of our programs.”

South Centers, along with the University of Rio Grande, for years now, have collaborated in the production of educational videos, but clearly the best days for video still lie ahead. New shows, formats, and use cases are all under development, and you will begin to see the medium being used more prolifically as the year progresses.

Currently, most of the video content produced by the two educational partners take the form of a talk format with a host(s) and guests, covering a variety of topics including scientific research, community, Extension, education, business, and spirituality.

“We try to provide a variety of differ-

ent content for those individuals who specifically have a need for them,” said Executive Producer Patrick Dengel, who heads up the collaboration between the two entities and has his hand in pretty much every aspect of the operation – he hosts, produces, promotes, and anything else that needs done.

Some of the most popular programs include those with an agriculture and natural resources-based theme like John Grimes' Ag News, a show focused on issues facing the beef industry, and Natural Resources Specialist Dave Apsley's Tree Talk. Another popular show, however, is hosted by Dustin Homan and titled Culture Cast. Homan's work with international youth development takes center stage on the show, where he interviews college students about their adventures studying abroad.

“The reason we have so many categories of shows is ... not everyone is interested in agriculture, and not everyone is interested in Extension work, but they may be interested in something like our dog training program or our arts and culture shows,” Dengel explained.

Dengel's team includes Program Managers Duane Rigsby and Mike Thompson, of South Centers and Rio Grande, respectively, and South Centers Production Director Sarah Swanson. The number of different monthly shows

the team churns out has grown to around 38 over the years, and there are currently around 46 hosts who appear either on a regular or part-time basis.

These various programs are streamed live on Wednesdays (Rio Grande) and Thursdays (South Centers), and are always available on demand on YouTube. Additionally, all shows are also carried on PTV (Perkins Telecommunications), a public educational access channel located in the Youngstown area, and select shows also air on Rio Grande Cable Access and Hillsboro public access television.

The South Centers YouTube channel, which had 147 public uploads in 2018, saw massive gains in nearly every measurable. The channel nearly doubled in the major categories of subscribers gained, total views, and minutes watched.

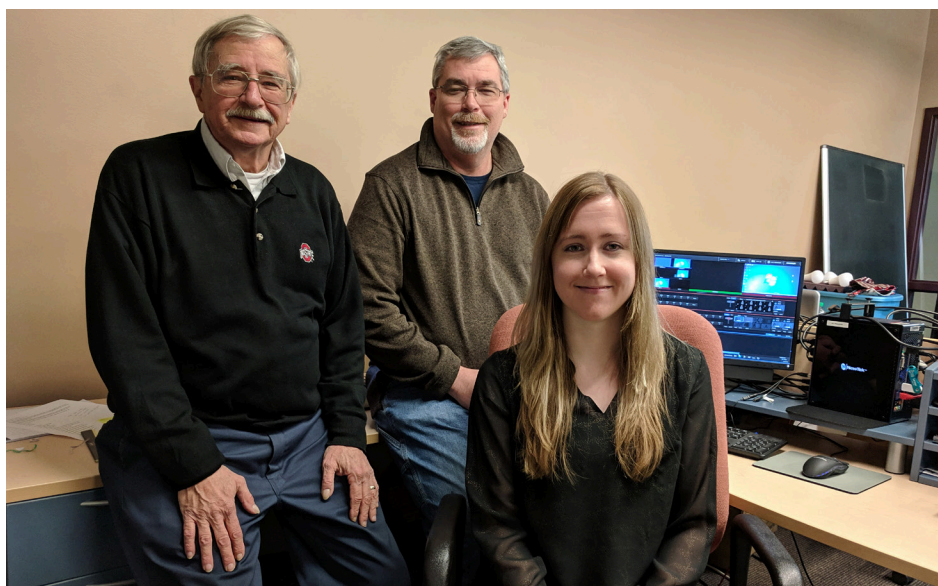
The channel also grew in the sense that hosts from outside the South Centers campus are getting on board, such as CFAES Dean Dr. Cathann Kress, Melissa Vince with the Ohio Bureau of Worker's Compensation, and various Extension educators like Christine Gelley, who hosts one of the most popular new shows, Forage Focus.

“I think it is fantastic. Bringing in outside talent also brings South Centers recognition in the fact that we are doing something very positive that they can incorporate,” stated Dengel.

In 2018, video production at South Centers also got a new home, moving from “BOB” (a colloquialism for the building out back) to a larger space on the second floor of the Endeavor Center.

“We have a lot more space to move around, and work with our equipment,” said Production Director Sarah Swanson, whose penchant for fine details like proper lighting, audio, and content framing helps give the content a high-quality look and feel. “It is better for sound and lighting, and everyone and everything looks far more realistic because we are not right on top of the green screen now.”

*See VIDEO Page 3*



*Pictured are members of the OSU South Centers video production team, from left, Patrick Dengel, Duane Rigsby, and Sarah Swanson. (Photo: Bradford Sherman/CFAES)*

## VIDEO from Page 2

Looking ahead to 2019, Dengel says he is looking at diversifying the content you will see on the channel. The approximate half hour talk formats are not going anywhere, but plans call for the inclusion of shorter videos that focus on more specific topics.

"We're going to do more 5-10 minute shows, and also two minute shows," explained Dengel. "The two-minute shows would touch one topic very quickly, kind of a bird's eye view of the topic. The slightly longer 5 to 10-minute format will take a specific item and really explore it. This is about getting away, a little bit, from the talk format and into more of an instructional-type thing."

The use of video, particularly through a platform as immensely popular as YouTube, will also help South Centers and Rio Grande reach a younger demographic, according to Rigsby, who in addition to a program manager for video projects, also serves as Technology Coordinator at South Centers.

"Video really gives us the ability to expand our programming to the younger generations, your millennials, Generation Z, and younger," he said. "It is the only way we are going to reach that demographic, video is easily the most popular way they look for content."

So in addition to what is already being done, what is the next step in growing the footprint of video content? Dr. Worley is encouraging all programs at South Centers to embrace the medium and find ways to utilize it. "I encourage all of our program specialist and staff to engage in applying these delivery methods," he said.

Dengel also says he would love to see one of the shows be picked up and aired on an NPR station, and to gain even more traction on more public education television stations.

Anyone interested in either hosting a show, or if you are affiliated with a television station that is interested in carrying educational shows from OSU South Centers and the University of Rio Grande, contact Dengel by calling 740-708-7810 or email him at [dengel.3@osu.edu](mailto:dengel.3@osu.edu).



**ABOVE:** Mike Thompson, Director of Instructional Design and Media Services at The University of Rio Grande, is pictured at the production controls inside the Rio Grande studio. He is the Program Manager for the educational programs produced by the school, in collaboration with The Ohio State University South Centers.

**BELOW:** The monthly schedule of telecasts, as they stream on YouTube.

Wednesday programs are available at [go.osu.edu/riogrande](http://go.osu.edu/riogrande) and Thursday programs are available at [go.osu.edu/osusc](http://go.osu.edu/osusc). Schedule subject to change.

FIRST WEDNESDAY and FIRST THURSDAY of EACH MONTH		
WEDNESDAY	1:00	OVb Common Sense Brad Bapst & Ryan Mapes
	2:00	Pawstive Partners Tom Heiskell & Mike Thompson
	3:00	VORG - President Dr. Clark, President
	4:00	Jamie Nash Buckeye career Center
THURSDAY	9:00	Cultural Cast Dustin Homan & Patrick Dengel
	10:00	Food, Nutrition and Wellness Dan Remley & Duane Rigsby
	11:00	Special Special
	12:00	The Jubilee Catholic Museum Shawn Kenney & Wanda Dengel
SECOND WEDNESDAY and SECOND THURSDAY of EACH MONTH		
WEDNESDAY	11:30	Bossard Library Debbie Saunders
	1:00	Safety Net Sheriff Wood, Scott Borden, & Lt. Barry Call
	2:00	Exposition - Art Valerie Thomas & Mike Thompson
	3:00	VORG - Provost Dr. Richard Sax, Provost Rio Grande
	4:00	Voice of the Valley T.R. Edwards
THURSDAY	9:00	Ag- News John Grimes, Duane Rigsby
	10:00	Amanda WOODS Consumer Finance Educational Program
	11:00	Tree Talk Dave Apsley, Duane Rigsby
	12:00 n	Dr. Kress Extension Dr. Cathann Kress
THIRD WEDNESDAY and THIRD THURSDAY of EACH MONTH		
WEDNESDAY	12:00	Alumni Talk with Delyssa Delyssa Edwards
	1:00	Agri-Talk Duane Rigsby & Mike Thompson
	2:00	Tech-Talk Kingsley Meyer & Mike Thompson & Duane Rigsby
	3:00	VORG - Community Education Dr. Craig Klein, Dean Rio Grande Community Prog
	4:00	South Gallia Today Bray Shamblin
THURSDAY	9:00	Portsmouth Chat Lisa Carver & Kim Bauer
	10:00	Forage Focus Christine Gellay and Patrick Dengel
	11:00	Bureau of Workmans Comp Melissa.V.1@bwc.state.oh.us <Melissa.V.1@bwc.state.oh.us>
	12:00	Inspiration Focus Deacon Terrance Acox
FOURTH WEDNESDAY and FOURTH THURSDAY of EACH MONTH		
WEDNESDAY	12:00	Inspiration Focus Jeremy Hollingshead
	1:00	Body Talk Marlene Childers & Mike Thompson
	2:00	Eye on the STORM Jeff Lanham & Randy Payton
	3:00	VORG - Deans Dr. Donna Mitchell & Dr. Heather Duda, Deans
	4:00	School Pride, County Wide Jude Meyers, Superintendent
THURSDAY	9:00	South Centers Chat Tom Worley
	10:00	Pike County Exention Tammy Jones & Kristen Campbell
	11:00	Marketing Matters Christie Welch
	12:00	Happening Now Jennifer Dunn & Patrick Dengel



# SBDC helps businesses grow, increase sales, create and retain jobs in 2018

**By Brad Bapst**  
SBDC Director

One of the core components of the Business Development Network at The Ohio State University South Centers continues to be the Small Business Development Center (SBDC).

The SBDC provides business counseling and assistance to individuals who are either starting or growing their business. The Piketon center is staffed with highly trained, Certified Business Advisors (CBA) to help small businesses and entrepreneurs with development and growth to increase sales and create jobs in their local communities.



*Pictured are members of the business team at OSU South Centers. From front to back on the left are Christopher Smalley, Ivory Harlow, Jennifer Dunn, Brad Bapst, and Mick Whitt. On the right are Patrick Dengel, Melissa Carter, Kelly O'Bryant, and Ryan Mapes. (Photo: Sarah Swanson/CFAES)*

A vital component of the SBDC is the Export Assistance Network (EAN). International markets provide opportunities for businesses to increase sales and create jobs. Many small companies do not have the expertise or resources to expand their business into international markets. The EAN helps companies to expand globally through counseling in the areas of market research, due diligence, general export education, export readiness assessments, and trade missions.

During fiscal year 2018, the SBDC at the OSU South Centers provided the following assistance to entrepreneurs and businesses in the Southern Ohio region:



**Small Business  
Development Centers**

## JOBS AND JOB GROWTH



**2,814** NEW JOBS CREATED

**7,814** JOBS RETAINED

**721** NEW BUSINESSES STARTED

## SALES AND SALES GROWTH

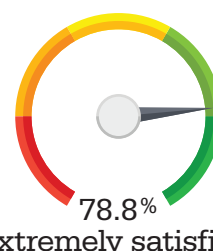
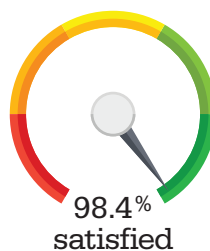
**\$320** MILLION NEW SALES

**\$147** MILLION NEW INVESTMENTS  
(DEBT AND EQUITY)

**\$145** MILLION EXPORT SALES



## CLIENT SATISFACTION



## ENTREPRENEURS

**7,667** BUSINESSES ADVISED

**764** TRAINING EVENTS

**10,381** ENTREPRENEURS TRAINED

**53,447** TOTAL HOURS OF CONSULTING SERVICES

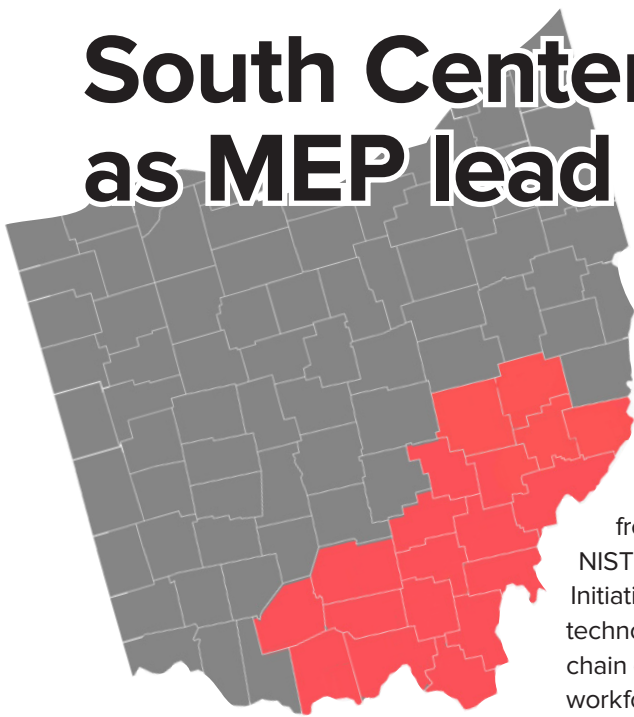


[SBDC.DEVELOPMENT.OHIO.GOV](http://SBDC.DEVELOPMENT.OHIO.GOV)

See SBDC Page 5



# South Centers serves as MEP lead affiliate



**By Ryan Mapes**

*Business Program Leader*

The Ohio State University South Centers is currently serving as the Southeast Manufacturing Extension Partnership (MEP) lead affiliate through September 30, 2019.

Our team recently submitted a proposal to continue serving as the lead MEP affiliate for Subregion 1, plus several contingent counties for the years 2020 and 2021. Counties requested to service are as follows: Adams, Athens, Gallia, Guernsey, Highland, Hocking, Jackson, Lawrence, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Ross, Scioto, Vinton, and Washington.

The primary goal of the program is to accelerate the growth of over 500 regional manufacturers identified as small and medium-sized manufacturing enterprises (SMMs) within the region. In addition to providing growth advisory services, MEP at OSU South Centers will leverage Ohio State's resources and relationships to create a robust support network.

The MEP at South Centers has identified

the five largest manufacturing clusters within the Southeast region: food, wood products, polymer and chemical, primary metals, and automotive supply chain. The MEP at South Centers will develop targeted services by data gained directly from regional companies to address

NIST's Next Generation Strategy Initiatives of continuous improvement, technology acceleration, supply chain optimization, sustainability, and workforce development.

The program will also will work closely with the other five Ohio MEP organizations to provide SMMs with access to numerous resources and facilities throughout the region and state, as well being a conduit to such resources as The Ohio Manufacturing Institute, the Robert C. Byrd Institute, Shawnee State University, and third-party consultants. The program will create a regional network of resources for client companies that is closely integrated with economic development organizations and business service providers, as well as academic institutions, in order to exponentially increase impact in providing resources to SMMs.

The MEP at South Centers will employ growth advisers to work with manufacturing leaders across the region to solve businesses' issues and improve the economic competitiveness of the small and mid-sized manufacturing base. These growth advisers will provide one-on-one consultation for clients, get to know and understand the client's business and needs, and serve as conduits to relevant and qualified resources and providers to meet those needs.

## SBDC from Page 4

- Provided consulting to 334 clients, of which 229 received five or more hours of consulting
- Assisted with starting 25 businesses
- Helped clients obtain \$10,214,900 in capital
- Logged 4,323 consulting hours
- Held 19 training events with 344 attendees
- SBDC Clients created 106 new jobs and retained 532 jobs
- Recorded \$4,944,400 in general sales growth for clients

Regional partnerships are the primary source of referrals for the SBDC at South Centers. Collaborative efforts with local chambers of commerce and economic development offices serve as the primary conduit to connect entrepreneurs with the services of the SBDC. South Centers also maintains formal agreements with local universities for regional economic development collaboration. Pike County Community Action and the Minority Business Assistance Center are also key partners with the SBDC. These relationships help the region's entrepreneurs, business owners and small manufacturers with technical assistance and training.

### Core SBDC Services Include:

- Business assessment evaluation
- Cash flow analysis
- Financial projections development
- Strategic business planning
- One-on-One business counseling
- Identifying sources of capital
- Workshops and training programs
- Marketing strategy development
- Market feasibility and research
- Export Assistance

To schedule an appointment to meet with one of our highly trained counselors, contact Brad Bapst, SBDC Center Director at 740-289-2071 ext.230, or [bapst.4@osu.edu](mailto:bapst.4@osu.edu).



# MARKETING MATTERS

## Direct Marketing provides training, education, and technical assistance to food producers and marketers in 2018

**By Christie Welch**

*Direct Marketing  
Program Manager*

The Direct Food and Ag Marketing Team is focused on providing training, education, and technical assistance to Ohio's food producers and marketers.

The goal of this assistance is to help these small businesses increase their effectiveness and, thereby, their profitability. This should translate to healthier farms, food producers, and communities where they reside; and increase access for consumers to locally produced foods.

In 2018, the team provided many trainings and educational presentations throughout Ohio. Highlights of these include:

- **MarketReady** – A one-day workshop that helps local food producers explore various market channels including direct to consumers, direct to restaurants, direct to wholesale, and direct to institutions. The workshop focused



*Sandy Gross, co-founder of Sleepy Bee Café's, was a part of The Appalachian Table, Where Local Food Buyers and Producers Meet, held for the first time at OSU South Centers.*

on the main business functions for each of these market channels. The trainings were delivered to 31 participants and were held in conjunction with OSUE Cuyahoga and Brown Counties and the University of Kentucky's Center for

Crop Diversification. An attendee said of the training, "the diversity information, the networking, and the transparency are what I liked best about MarketReady." Another said they valued all the expertise from the different presenters. In addition to the previously mentioned collaboration, Ivory Harlow of the Center for Cooperatives shared information about cooperative development and marketing with the attendees.

- The Appalachian Table, Where Local Food Buyers and Producers Meet was held for the first time at OSU South Centers. The Appalachian Table event brings food producers, businesses, and buyers to the table to experience a local foods meal, make meaningful connections, and spark interest in the diversity of products produced in the Appalachian region. The event provides a forum to share information, learn best practices, and facilitate peer-to-peer learning and networking.

*See MARKETING Page 7*



## MARKETING from Page 6

Potential buyers are exposed to a wide variety of locally produced foods from the Appalachian region of Ohio. The event features an all-local foods breakfast including coffee, baked goods, proteins, dairy, and grains.

Producers have an opportunity to learn how peers are successfully marketing through various channels including major retailers, farm-to-fork restaurants, community-supported agriculture programs, and direct-to-consumer markets. During the 2018 event, Sleepy Bee Café's founder, Sandra Gross, and Executive Chef, Francis Kroner, shared information with attendees on how they procure locally produced foods for three restaurant locations in the Cincinnati area.

- Partnered with the OSU Resource and Ag Law Program, Wright & Moore Law, LPP, and Ohio Farm Bureau to host the second annual Ohio AgritourismReady Conference. More than 40 individuals attended the conference and learned how to grow their agritourism enterprises, how to manage liability, best marketing practices, and much more. Bill Bakan, Fun Tsar of Maize Valley, which is a Family Farm Market & Winery creating fun, local & healthy experiences for all, was the keynote speaker and very well received by those in attendance. Comments included: "outstanding presentation;" "awesome, fantastic;" "please bring back;" and "Loved the energy and great information."
- The team is participating in a Connect & Collaborate Grant project with Dr. Abby Snyder, Field Specialist, Food Safety & Management with OSU Extension. The project began in December 2018 and will continue into 2019. The Direct Marketing Team is assisting with the objective to provide technical services for processors by funding a process analysis service needed in product development and regulatory compliance.

In addition, team members presented a variety of marketing trainings throughout Ohio including:

- Marketing Programs to Program Development and Evaluation (COMLDR 3330) for Dr. Scott Sheer's class
- Marketing for New and Beginning Farmers to Ohio Ecological Food and Farm Association's New and Beginning Farm Training
- Marketing Matters – Free monthly marketing presentations that are delivered through online streaming and the team's YouTube channel.
- Marketing Your Small Business in a Digital World – For the East Central Ohio Beekeepers Association and the Ohio State Beekeepers at their annual conference



*Connect & Collaborate began in December 2018 and will continue into 2019. The Direct Marketing Team is assisting with the objective to provide technical services for processors by funding a process analysis service needed in product development and regulatory compliance.*

- Additional marketing presentations were given at the Ohio Produce Growers and Marketers Association, The University of Rio Grande's business class, AgritourismReady Conference, The Ohio & West Virginia Food Hub Network, and many more.

In addition, team members continue to participate in a variety of groups throughout Ohio including: Pike County Local Foods Group, Initiative for Food and AgriCultural Transformation (InFACT), The National Farm to Cafeteria Conference organized by the OSU Farm to School program, OPGMA's educational committee, and the National Farmers' Markets Working Group.

The team published the factsheet; Accepting Supplemental Nutrition Assistance Program (SNAP) benefits at Ohio Farmers' Markets and is available via Ohioline.

If you would like to be a member of the Direct Food and Agricultural Marketing Team or would like additional information please contact Christie Welch, [welch.183@osu.edu](mailto:welch.183@osu.edu).

# Following successful 2018, Endeavor Center enters transition period as new year begins

By Ryan Mapes

*Endeavor Center Manager*

The Endeavor Center operated at a 100% occupancy rate for most of 2018, however the new year brings some challenges and opportunities as the Endeavor Center is going through a period of slight transition.

During 2018, we had three partners graduate, but were fortunate to have new partners ready to come on board to fill the vacated offices. Recent partners that have joined the Endeavor Center include:

**State Street Laboratories LLC – SSL** operates as an independent diagnostic testing lab and a forensic toxicology testing lab in Piketon and Athens.

**Health and Wellness Bootcamp** – this company helps people connect the dots between food, mental, physical, emotional, and spiritual well-being.

**Foster's Creative Capital Inc.** has changed status from a virtual partner to obtaining a physical office. This company is focused on assisting local business owners in finding alternative sources of capital.

**Hoy Insurance Group** joined as virtual partner. Virtual partners do not occupy a physical office, but can utilize shared work areas and office equipment in the Endeavor Center.



**InSolves**, the center's largest partner, has purchased a manufacturing facility in Piketon and is in process of moving operations to that location. Over the next year, an office suite and the large manufacturing high bay areas will become available. Congratulations and thank you to InSolves for being a large contributor to the Endeavor Center's success.

The Endeavor Center applied for, and received, a grant from the Economic Development Administration to hire a consultant to complete an expansion feasibility study. One of the outcomes from the study will be to help management understand what types of incubator space are in demand.

Co-working space and maker space are types of spaces that have become

increasingly popular in the incubation industry. Co-working space is a self-directed, collaborative, flexible, and voluntary work style that is based on mutual trust and the sharing of common core values between its participants. Co-working involves a shared workplace, often an office, and independent activity. Unlike in a typical office, those co-working are usually not employed by the same organization.

A makerspace is a collaborative work space inside a facility for making, learning, exploring, and sharing that uses high-tech to no-tech tools. These spaces are open to entrepreneurs and could have a variety of maker equipment ranging from 3D printers, laser cutters, CNC machines, soldering irons, or even sewing machines.

As of January 2019, there are 18 partner companies that occupy 25 office and light industrial bay spaces. We also have four virtual partners that occupy the building on a part-time basis but do not occupy an office. The Endeavor Center training rooms and studio are being utilized frequently by OSU programs, our partners, and outside organizations. Fluor continues to hold many off site meetings at our facility and our SBDC continues to strengthen partnerships by jointly hosting training events with local business development partners.

## Export Assistance Network connects Turkish buyers with wood products manufacturers

By Kelly O'Bryant

*SBDC Export Assistance*

In 2017, hardwood lumber exports in the United States was a \$2.3 billion market, according to USDA FAS. That same report shows that the total U.S. export market for hardwood logs was \$717.9 million. A majority of U.S. hardwood lumber products are sold domestically, here in the United States, but Ohio is a major export contributor for hardwood lumber, logs, and manufactured wood products.

The Ohio State University South Centers Export Assistance Network, along with the United States Department of Agriculture Foreign Agriculture Service, coordinated a reverse trade mission September 24-27, 2018 hosting eight Turkish lumber, log, and veneer buyers to meet with Ohio wood products manufacturers.

The delegation made 12 direct stops at mills and manufacturing plants as well as a participated in a networking/matchmaking reception.



# COOPERATING

## *for the Common Good*

**By Hannah Scott**

*Center for Cooperatives Program Manager*

What do a small group of fish and shrimp farmers purchasing feed together have in common with a classroom full of high school students who share the work of a successful 200+ acre livestock and grain farm? What do a group of small-scale vegetable growers collectively marketing produce have in common with a barista-owned coffee shop?

## They're all cooperators.

At the CFAES Center for Cooperatives, we like to say, "If you've seen one co-op, you've seen one co-op," a mantra that certainly seems to describe our work in 2018. Over the last year, the Center's team supported cooperative development efforts across Ohio and West Virginia in a variety of areas. Team members helped aquaculture producers develop a business plan for cooperative purchasing, an effort to make their farms more efficient and sustainable. They helped growers in Mansfield and Moorefield – Ohio and West Virginia, respectively – learn about the cooperative business model

and develop market assessment tools to evaluate how they could use a co-op to access new market channels. They led the completion of a multi-organizational feasibility study for a cooperative in the forest and wood products industry. And they helped link veterans developing a farmer-veteran training program to resources in OSU Extension and the U.S. Department of Agriculture.

These efforts were made possible by funding from the U.S. Department of Agriculture's Rural Cooperative

*Community members in Mansfield, Ohio kickoff their work together exploring a farmer-owned cooperative.*



Development Grant program, which will continue in 2019, supporting the Center's efforts to strengthen rural economies through cooperative development. The Center will focus on cooperative development in food and agriculture, forestry, rural connectivity, and worker-ownership in 2019.

The Center will also continue efforts to educate various audiences about the cooperative business model, building on successes launched in 2018.

*See CO-OP Page 10*



## CO-OP from Page 9

In June 2018, the Center launched Co-op Mastery: Beyond Cooperatives 101, an innovative online training course and companion workbook designed to educate cooperative members, boards, management, employees, and students. Co-op Mastery's curriculum focuses on mid-level knowledge about the cooperative business model, providing an in-depth look at governance, finance, taxation, and other areas. Ivory Harlow, a program specialist with the Center, received the OSU CFAES Staff Advisory Council's 2018 Key Values Award in the area of Innovation for her work developing Co-op Mastery.

The Center also brought cooperative education to a variety of stakeholders through workshops and seminars in 2018, sponsoring the seminar, "Agricultural Data Coalition: Putting Farmers in the Driver's Seat," and co-sponsoring, "Co-op Law & Practice CLE," in partnership with the University of Dayton School of Law and Advocates for Basic Legal Equity, Inc. (ABLE).



*ABOVE: Ivory Harlow, left, with Dean Cathann Kress, middle, and fellow award winner Bill Smiley, was recognized for her work developing Co-op Mastery with the 2018 CFAES Staff Advisory Council Key Values Award in Innovation.*



*Dr. Scott Shearer speaks to an audience about a cooperative initiative in agricultural data ownership and the importance of data ownership in the era of precision agriculture in a seminar hosted by the Center in 2018.*

Center team members taught cooperative workshops at conferences around the region and nationally, including the 2018 Association of Cooperative Educators Annual Institute and Building Wealth through Worker-Ownership in partnership with the Ohio Employee Ownership Center at Kent State University and the Appalachian Center for Economic Networks (ACENet).

Center team members are looking forward to leading sessions at the National Council of Farmer Cooperatives 2019 Annual Meeting, the 15th Annual West Virginia Small Farm Conference, and the Ohio Small Farm Conference in 2019, among many others.

Connect with the Center for Cooperatives on Facebook (@OhioStateCooperatives), Twitter (@OSUCooperatives), and the Collaboration Nation blog ([u.osu.edu/osucooperatives](http://u.osu.edu/osucooperatives)).

Visit the Center's website at [go.osu.edu/cooperatives](http://go.osu.edu/cooperatives) and contact the Center at [osucooperatives@osu.edu](mailto:osucooperatives@osu.edu) or 740-289-2071 ext. 111.



## STAFF PROFILE

# Wayne Lewis: celebrating 35 years at OSU

*(Editor's Note: The following is the latest in a series of feature stories highlighting The Ohio State University South Centers Staff)*

**By Bradford Sherman**

*CFAES/OSU South Centers*

Wayne Lewis has seen it all, and then some.

Not only has he been a part of The Ohio State University South Centers since the doors first opened back in 1991, he was also a university staff member for seven prior to then. In all, Lewis is closing in on another milestone – his 35th year of employment with OSU.

With his work anniversary date coming up in May, the South Centers Farm Manager sat down with Connections to reflect about his time at the university, talk about how South Centers has evolved over the years, and what's next for him.

"We didn't even have possession of these buildings yet," Lewis recalled of his first days at South Centers. That's because for the first few months of being open, South Centers offices were housed at the old Piketon Grade School on Clark Street. It wasn't until later in the year 1991 that staff moved into structured located on the current Shyville Road property.

Lewis was employee No. 4 at South Centers; today, the staff is 10 times the size it was when he was hired. With more people comes more programs and projects, and obviously, the technology has gotten much better too.

"The technology changes have been

*Wayne Lewis is pictured aboard a John Deere tractor, piloting a wagon field tour of the South Centers research plots. In May 2019, Lewis will celebrate his 35th work anniversary at The Ohio State University. (Photo; Bradford Sherman/CFAES)*

remarkable," Lewis stated. "There were a few computers here, but I didn't have one. Everything had to be hand-written on paper."

At South Centers, Lewis first fulfilled the role of an agricultural technician, the same title he held when he moved over from the Western Research Station near Springfield, where he got his start with OSU seven years earlier. His first responsibilities there saw him tending to the dietary needs of swine.

At South Centers, he moved up the ranks to become an Assistant Manager of Farm Operations and then Assistant Farm Manager, before finally ascending to his current role as Farm Manager.

Lewis is a graduate of Southwestern High School, which was once part of the Gallia County School System prior to

consolidation. He worked on a private farm out of school before joining The Ohio State University in 1984.

When asked about what he likes best about coming to work every day, he said it is the relationships he has with his fellow employees. "The best part has to be the people – I get along with everyone. It's almost like a family atmosphere," Lewis said.

So what's up next for Lewis? Will he be making that 40-year milestone? To hear him talk, he sounds like he still has plenty of gas left in the tank.

"As long as there are more days that I don't mind coming to work, than ones that I do, then I'll still be here."

Lewis and his wife, Cindy, reside in Jackson on the campus of the Jackson Agricultural Research Station.



# Money Does Grow On Trees

## Development of the Ohio Pawpaw Industry

**By Brad Bergefurd and Dr. Matt Davies**

If you're lucky, valuable fruit in high demand could be growing in a tree on your property. Per acre, a pawpaw orchard has the potential to produce an annual gross income of \$50,000, including \$15,000 per acre for fresh fruit, \$30,000 per acre for frozen pulp, and \$5,000 an acre for seed and scion wood.



**LEFT:** CFAES master's degree student Sarah Francino is pictured collecting on-farm orchard data.

**RIGHT:** Pawpaw research orchards were planted on both Columbus and Piketon campuses.



*Columbus campus research planting Team*

Due to the pawpaw's enticing taste and untold culinary possibilities, it is in high demand by brewers, consumers, chefs, bakers, ice cream manufacturers, and fresh fruit purveyors throughout Ohio. Pawpaw production has been researched on a small-scale at the OSU South Centers in Piketon since the 90's with small acreage observation and demonstration trials.

In 2018, Marketing and Orchard Resource Efficiency (MORE) Ohio Pawpaw, a new statewide, grant-funded project spearheaded by Principal Investigators Brad Bergefurd, a horticulture specialist with OSU Extension, the outreach arm of CFAES and Dr. Matt Davies, an assistant professor in CFAES, were awarded funding for this research and education project thanks to a USDA and Ohio Department of Agriculture Specialty Crop Block Grant.

*See PAWPAW Page 13*



## PAWPAW from Page 12

Pawpaw trees, the largest edible fruit trees native to North America, grow from the Great Lakes down to portions of the Florida Panhandle with Mid-Atlantic and Midwestern states making up the predominant growing region. Pawpaw trees produce greenish-blackish fruit, usually three to six inches long. The flesh is pale to bright yellow and contains a network of glossy, dark brown seeds.

A pawpaw's flavor is sunny, electric, and downright tropical: a riot of mango-banana-citrus that is incongruous with its temperate, deciduous forest origins. They also have a subtle kick of a yeasty, floral aftertaste somewhat like unfiltered wheat beer.

"The flavor of pawpaws is forceful and distinct," wrote culinary historian Mark F. Sohn diplomatically in his encyclopedic book, *Appalachian Home Cooking*.

The members of the Lewis and Clark expedition ate pawpaws for pleasure, and, for a period in Missouri in 1806, subsistence. Our early American ancestors enjoyed pawpaws for centuries, spreading them as far west as Kansas. In 1541, the expedition of conquistador Hernando de Soto recorded Native Americans growing and eating pawpaws in the Mississippi Valley. Even though they had to clear pawpaw trees to create farmable land, white settlers savored pawpaw fruit —often the only fresh fruit available nearby.

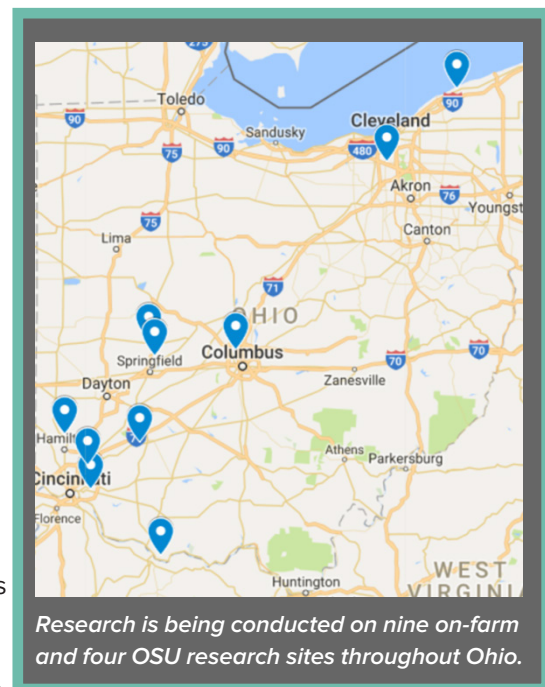
Want to try some pawpaw fruit? Ask around at your local farmers market, where pawpaw fruit may show up around August, September, or early October. It is not cheap, but you can have fresh pawpaw fruit shipped to you in season, and frozen pawpaw pulp year round. The specialty foods company Earthy Delights says that requests for pawpaws have gone up every year since National Public Radio first aired a story about them in 2011. You can also go directly to the source and contact other regional growers and gatherers, who may be selling both frozen pulp and mixed fruit.

### How to Drink Pawpaws

Can't find fresh pawpaw fruit? Drink beer! Pawpaw-flavored craft beer is popular among Ohio craft beer enthusiasts and is perhaps one of the most accessible ways pawpaws have been brought to the people. Breweries such as Weasel Boy Brewing in Zanesville, Sixth Sense Brewing in Jackson, and Jackie O's Brewery in Athens are just a few Ohio craft breweries using pawpaw in specialty craft brews.

### Interested in Pawpaw growing?

To acquire unbiased, research-based information to help grow the Ohio Pawpaw industry, over two acres of research orchards and native woodland research trials have been established on the Columbus and Piketon campuses of OSU. Pawpaw information from this and past years trials and from the Ohio Pawpaw Growers Association can be found on the projects web site at [southcenters.osu.edu/horticulture/fruits/pawpaws](http://southcenters.osu.edu/horticulture/fruits/pawpaws), or to receive information on upcoming pawpaw trainings and field days, subscribe to the email list at [go.osu.edu/horticulturelistserv](http://go.osu.edu/horticulturelistserv) or contact Brad Bergefurd at [Bergefurd.1@osu.edu](mailto:Bergefurd.1@osu.edu) or call him at the South Centers.



*Jackie O's Beer (left) and Integration Arce's Pawpaw Pulp (below) are two products of pawpaws.*



The MORE Ohio Paw project is a partnership with the Ohio Department of Agriculture, the USDA and the Ohio Pawpaw Growers Association.



# New Hop Research Funding Received to Further Develop the Ohio Hop Industry

By Brad Bergefurd, Thom Harker, Charissa Gardner, Wayne Lewis, Ryan Slaughter, Zach Zientek, and Becky Colon

Since The Ohio State University South Centers began hops research and educational programming in 2012, more than 100 farmers have become attracted to hop growing due to the continued demand for Ohio-grown hops from the craft brewing industry, and the high value crop opportunity hops offer to small acreage landowners.

Decades after disease and prohibition wiped out hops production in the Midwestern United States, Ohio's hop acreage is making a comeback, rising to 200 acres from roughly 10 acres in 2012, according to Brad Bergefurd, Agriculture and Natural Resources Extension Educator and Horticulture Specialist with the OSU Extension in Scioto County and at South Centers in Piketon.

Hops can cost \$10,000 or \$20,000 per acre to plant, according to university crop production budgets and research. An Ohio brewer, consumer, and hop farmer survey – conducted by the Ohio Hops Growers Guild and partially funded through a grant by the South Centers USDA Cooperative Development Center – indicated over recent years that breweries in Ohio want to buy local. Just as with all local direct agricultural marketing opportunities in Ohio, brewers want to put a face with the farmer growing their hops, which is a big selling point for Ohio brewers. The hop farmers survey results indicated that nearly every hop grower in the state intends to plant more hops in the near future.

To advocate for, and educate, the state's hop farmers, roughly 70 growers have joined the Ohio Hops Growers Guild, which released a set of standards for a seal of quality for hop growers to help guarantee high quality and food safe hops continue to be produced for Ohio craft breweries. If a brewer has a bad experience with poor quality hops because the farmer does not manage their crop properly, it hurts hop growers in general, just like someone who makes lousy beer taints the entire industry.

*See HOPS Page 15*



*Horticulture Research Assistant Thom Harker is pictured collecting hop analysis data.*



## HOPS from Page 14

Hops production is no get-rich-quick endeavor, according to research conducted by Bergefurd and the OSU Hops Research and Education team. It costs more than \$10,000, and more than \$20,000 for some farms, per acre to plant and the crop doesn't produce a full crop until year three.

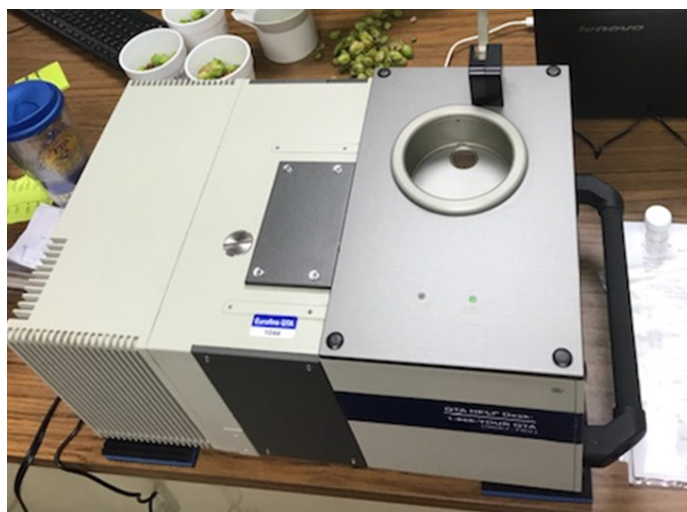
Bergefurd and the other members of the OSU Hops Research and Education team have been conducting the development program since 2013 when they received USDA grant funding from the Ohio Department of Agriculture and planted the first hop research trials on record at The Ohio State University. According to Bergefurd, "as with any type of farming, if there's a market to be had, we want to teach our farmers to be aware of the opportunity and see if it fits their farming operations.

"There's a lot of infrastructure and upfront costs before you get the first dollar back," Bergefurd added. "I always warn those interested – do not underestimate the hand and stoop labor that is required."

Hops cannot be harvested with a tractor. They grow on large 20-foot-tall trellises made of aircraft cable and poles similar to telephone poles, so the plants must be harvested by hand, removed from the hop yard, and then a large picker is used to mechanically remove the hop cones from the plant. Plus, hops require precisely timed harvesting. "They'll go from not being ready to too far gone within a matter of three or four days, weather-dependent," Bergefurd explained. "Farmers get caught off guard by not having the labor to get it done in a timely manner."

Hops quality is normally verified using laboratory wet chemistry methods that require reagents such as toluene, but these methods can be time-consuming and affect the cycle time of a facility. Due to the importance of harvest timing, and to ensure a high quality crop for brewers, in 2018 the South Centers began a research partnership with an international, Ohio-based company, Eurofins QTA, a subsidiary of Eurofins Scientific located near Cincinnati that has developed technology that provides a method of hop analysis which allows for hops to be tested for multiple parameters, such as alpha and beta acids, in 60 seconds using the latest in infrared technology – compared to three days to collect, mail, and test hops in a laboratory setting currently.

This enhanced hop quality analytics equipment and procedures will allow farmers to determine prime harvest



**ABOVE:** New hop analytic testing technology being tested at OSU South Centers. **BELOW:** Breweries that bought Ohio hops in 2018.



times quicker, and that can lead to increased hop quality for brewers. This new hop analysis technology was installed in the recently built hop and small fruit quality analysis lab at OSU South Centers in 2018. Preliminary test data from quality analytics of hops harvested from the OSU hop research yards and from farmer-cooperator hop yards indicates that this new technology can provide similar results to the current laboratory hop testing procedures, but within minutes instead of days.

"By all accounts, the demand for hops is expected to continue to grow. So long as the brewing industry keeps pouring, bottling, and canning more craft ale, there should be a market for Ohio-grown hops," says Bergefurd.

# A Fruitful Year

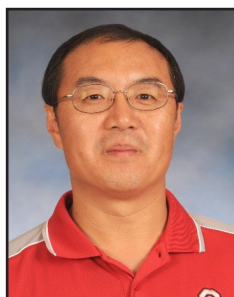
## Small fruit program continues research, educates and trains new and existing growers

**By Dr. Gary Gao**

*Extension Specialist and Associate Professor*

Ohio has quite a diverse fruit industry; and the high value fruit crops being worked with at The Ohio State University South Centers are aronia, blackberries, blueberries, elderberries, gooseberries, hardy figs, hardy kiwis, raspberries, wine grapes, and other emerging fruits.

According to the 2012 USDA Agricultural Census, Ohio had around 352 acres of blackberries, 381 acres of blueberries, seven acres of currants, 1,980 acres of grapes, 401 acres of raspberries, and 24 acres of other berries. Since 2012, quite a few growers have planted more berry crops. The biggest area of growth has been blackberries, blueberries, and raspberries.



**Dr. Gary Gao**

*See FRUIT Page 17*



*The fruit extension and research team members at OSU South Centers. Pictured from left to right are Ricardo Bordignon Medina (Ph.D. student from Brazil), Yanliang Chu (visiting scholar from Jiangsu University of Science and Technology), Ryan Slaughter (Research Assistant, OSU South Centers), Dr. Gary Gao (Program leader for berry crops) and Dr. Pengfei Wang (Visiting Scholar of Shanxi Agricultural University). Not pictured are Dr. Lijing Zhou (Research Associate, OSU South Centers) and Dr. Jiangbo Fan (OSU South Centers and Department of Plant Pathology).*

### Educational Resources

There are many different ways to gather resources from OSU South Centers. Website, Fact Sheets, bulletins, Twitter, books and videos are a few good examples.

#### Fruit Website at OSU South Centers:

[southcenters.osu.edu/horticulture/fruits](http://southcenters.osu.edu/horticulture/fruits)

#### EXTENSION FACT SHEETS:

- HYG-1132: Soil Testing for Ohio Lawns, Landscapes, Fruit Crops, and Vegetable Gardens  
[ohioline.osu.edu/factsheet/hyg-1132](http://ohioline.osu.edu/factsheet/hyg-1132)
- HYG-1133: Guidelines for Choosing a Soil Analytical Laboratory  
[ohioline.osu.edu/factsheet/HYG-1133](http://ohioline.osu.edu/factsheet/HYG-1133)
- HYG-1401: Growing Apples in the Home Orchard  
[ohioline.osu.edu/factsheet/hyg-1401](http://ohioline.osu.edu/factsheet/hyg-1401)
- HYG-1406: Growing Peaches and Nectarines in the Home Landscape  
[ohioline.osu.edu/factsheet/hyg-1406](http://ohioline.osu.edu/factsheet/hyg-1406)
- HYG-1421: Raspberries for the Home Fruit Planting  
[ohioline.osu.edu/factsheet/hyg-1421](http://ohioline.osu.edu/factsheet/hyg-1421)
- HYG-1422: Growing Blueberries in the Home Garden  
[ohioline.osu.edu/factsheet/HYG-1422](http://ohioline.osu.edu/factsheet/HYG-1422)
- HYG-1423: Growing Grapes in the Home Fruit Planting  
[ohioline.osu.edu/factsheet/hyg-1423](http://ohioline.osu.edu/factsheet/hyg-1423)
- HYG-1424: Growing Strawberries in the Home Garden  
[ohioline.osu.edu/factsheet/hyg-1424](http://ohioline.osu.edu/factsheet/hyg-1424)
- HYG-1428: Basic Principles of Pruning Backyard Grapevines  
[ohioline.osu.edu/factsheet/HYG-1428](http://ohioline.osu.edu/factsheet/HYG-1428)
- HYG-1429: Pruning Backyard Grapevines in the First Three Years  
[ohioline.osu.edu/factsheet/HYG-1429-2004](http://ohioline.osu.edu/factsheet/HYG-1429-2004)
- HYG-1430: Pruning Blueberry Bushes in the Home Garden  
[ohioline.osu.edu/factsheet/hyg-1430](http://ohioline.osu.edu/factsheet/hyg-1430)
- HYG-1431: Pruning Erect Blackberries in the Home Garden  
[ohioline.osu.edu/factsheet/hyg-1431](http://ohioline.osu.edu/factsheet/hyg-1431)

#### EXTENSION BULLETINS:

- **Midwest Home Fruit Production Guide:**  
[extensionpubs.osu.edu/midwest-home-fruit-production-guide/](http://extensionpubs.osu.edu/midwest-home-fruit-production-guide/)
- **Midwest Blueberry Production Guide:**  
[extensionpubs.osu.edu/midwest-home-fruit-production-guide](http://extensionpubs.osu.edu/midwest-home-fruit-production-guide)  
[southcenters.osu.edu/news/midwest-blueberry-production-guide](http://southcenters.osu.edu/news/midwest-blueberry-production-guide)

#### BOOKS:

Blackberries and Their Hybrids  
[cabi.org/bookshop/book/9781780646688](http://cabi.org/bookshop/book/9781780646688)  
[amazon.com/Blackberries-Hybrids-Production-Science-Horticulture/dp/1780646682](http://amazon.com/Blackberries-Hybrids-Production-Science-Horticulture/dp/1780646682)



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## FRUIT from Page 16

While Ohio may not boast the largest acreage in berry crop plantings, these small fruits are worth a lot of money. For example, an acre of blackberries on a rotatable cross trellis can provide a gross revenue of \$45,000, and an acre of blueberries can generate somewhere between \$16,000 to \$40,000 in gross revenue.

Dr. Gary Gao, Extension Specialist/Associate Professor and co-Director with the Center for Specialty Crops at OSU South Centers, says he feels very honored and privileged to support such an important sector of Ohio's agriculture.

"I have been conducting extension programs, research projects, and international collaboration in the area of high value fruit crops since 2011," said Gao. "Currently, our team consists of a research assistant, a research associate, a post doc, a Ph.D. from Brazil, and two visiting scholars from China. We are also blessed to have a strong team members of farm operations, program delivery, HR, accounting, and IT support."



*Gary Gao and Ryan Slaughter showcased our container berry production project at our Blueberry, Bramble and Wine Grape Field Night in 2018. (Photo: Dr. Pengfei Wang)*

### EXTENSION PROGRAMS FOR BOTH NEW AND EXISTING GROWERS:

Extension Programs in the areas of high-value fruit production have been the cornerstones of Gao's work at OSU South Centers in Piketon. Three of the main educational programs are the Blueberry, Bramble, and Wine Grape Workshop in March; Blueberry, Bramble and Wine Grape Field Night in July or August; and the Grape and Wine Analysis Workshop in December. The program also provides extension support to OSU Extension offices across the state of Ohio, Ohio Produce Growers and Marketers Association, Ohio Grape Industries Program, and Farm Science Review offered by The College of Food, Agricultural and Environmental Sciences at The Ohio State University.

Dormant pruning of berry crops is typically the main focus of the **Blueberry, Bramble and Wine Grape Workshop**. Normally, around a half hour or so is spent in the classroom introducing the program agenda and each other. What follows is a trip to the field in order to show our program attendees how to prune blackberries, blueberries, elderberries, raspberries, and wine grapes. Some years, aronia, currants, gooseberries, and other fruit crops of importance are included. Hands-on pruning demonstrations are always a good way to show folks how to prune. In 2018, the weather was good and the attendees of the workshop were able to learn basic and advanced pruning techniques for their fruit-growing operations.

The **Blueberry, Bramble, and Wine Grape Field Night** was offered in September, 2018, which was later than the typical July or August time frame due to scheduling conflicts. It focused on cultural management tasks, disease and insect identification and management, and fall fruit harvests, as well as key findings of research projects. Both Ryan Slaughter and Gary Gao served as the featured speakers.

The popular Grape and Wine Analysis Workshop was held in December, 2018. The program, as usual, drew good attendance and reviews. Drs. Lisa Dunlap (OSU-Horticulture and Crop Science), Gary Gao, Maria Smith (OSU-Horticulture and Crop Science), Mr. Todd Steiner (OSU-Horticulture and Crop Science), and Mr. Patrick Pierquet (OSU-Horticulture and Crop Science) were the featured speakers of this one-day program. Gao called this an excellent example of active collaboration between the Department of Horticulture and Crop Science and OSU South Centers.

**Farm Science Review** is one of the best programs that CFAES offers to farmers in Ohio. Gao has been a regular presenter at the Small Farm Center at this huge show. In 2018, he gave a presentation on container berry production to more than 40 attendees. Despite searing temperatures, the attendees were very engaged and asked a lot of questions.

Gao is also actively involved in the planning and delivery of **Ohio Grape and Wine Conference**. This two-day program is a joint effort between The Ohio State University and the Ohio Grape Industries Program or Committee (OGIC), and draws a large audience from the grape and wine industry. According to a 2016 economic impact study commissioned by OGIC, Ohio's grape and wine industry has a significant impact of \$1.3 billion on the state's economy annually, is the 6th largest wine producer in the country, and produces and sells 1.2 million gallons or more than a half-million cases of wine. The industry also boasts more than 270 wineries, 8,067 full-time jobs. See [findohiowines.com/about-ohio-wineries/economic-impact/](http://findohiowines.com/about-ohio-wineries/economic-impact/) for more information.

*See FRUIT Page 18*





*Vigorous blueberry bushes in containers at OSU South Centers in autumn, 2018. (Photo: Gary Gao)*



*Dr. Pengfei Wang examines elderberry flowers in the field. (Photo: Gary Gao)*

## FRUIT from Page 17

### RESEARCH PROJECTS:

#### Container Berry Production Project Funded by USDA Through Ohio DOA

This project was completed in 2018. Tried were production techniques of blackberries, blueberries and raspberries in containers. After three years of hard work, Gao is happy to report that berry production in containers can be a viable option in Ohio.

The best crop for growers, who do not have acidic soil, to try is blueberries. That pretty much encompasses the entire state, as Ohio rarely sees a soil pH of 4.5. Growers in northwest Ohio may find blueberry a viable crop to grow for the first time ever, if they grow in containers.

The recommended container size is 10 gallons, and are round and square ones. The substrate used was 100% aged loblolly pine bark, a byproduct of the paper industry. Growers could also add up to 30% of peat moss to the mix. There are also commercial mixes available. Fertilizers were a combination of slow release fertilizers with micronutrients. Nutrients can be incorporated or injected with drip tubes. Acid injection to irrigation water will be a necessity if the alkalinity level is high. The containers can be “buried” into raised beds for winter protection of the roots. “The blueberry bushes could live in the containers for many years,” explained Gao. “It is hard to tell exactly how many right now. I am hoping for at least 15 years in 10 gallon containers.”

#### Grafted Blueberry Tree Project (Department of Agriculture and USDA)

Sparkleberry (*Vaccinium arboreum*) is a large shrub or a small tree and can be used as a rootstock for greater adaptability of alkaline soils. The added benefit is that blueberry bushes grafted onto the sparkleberries can turn into a small tree for ease of machine harvest. Homeowners may plant them as small ornamental trees for beautiful white colors in spring, tasty fruits in June or July and red fall color.

#### Elderberry Fruit Ripening and Color Development Study

Dr. Pengfei Wang, a visiting scholar from Shanxi Agricultural University, conducted an experiment on fruit color development of elderberries in 2018. American elderberries are a native shrub and can be used in many different ways, such as for wine, jam, medicinal, baked goods, and its flowers can be used in pancake batter.

#### A New Study on LED Inter-lighting of Raspberries in Greenhouse

Ricardo Bordignon Medina, a Ph.D. student from Brazil, initiated a study on the use of LED lights on growth and phytochemical production of raspberries. Gao would like to thank Dr. Chieri Kubota (HCS), Dr. Mark Kroggle (HCS), Jim Vent (HCS), Dr. Abhay Thosar of Signify (Phillips Interact), Ryan Slaughter, Dr. Pengfei Wang, and Dr. Rafiq Islam for their help with the project.

### INTERNATIONAL PROGRAM:

#### 2018 Cochran Program – High Value Horticultural Crops

Gao and Beau Ingle applied for, and secured, a training grant to host eight Cochran fellows in 2018. This was a two-week program. The fellows visited many farms, organizations, and companies in Ohio. It was a very successful program.

For more information on our high value fruit crops, please contact Gao at [gao.2@osu.edu](mailto:gao.2@osu.edu)



# A SUCCESSFUL 2ND YEAR OF AQUACULTURE BOOT CAMP

**By Dr. Hanping Wang**  
*Senior Scientist*

The Ohio State University South Centers, in partnership with Ohio Aquaculture Association (OAA) and University of Wisconsin–SP (UWSP) and Wisconsin Aquaculture Association (WAA), have successfully completed the second year of Aquaculture Boot Camp-2 (ABC-2).

ABC-2 offers new and beginning farmers integrated training in aquaculture/aquaponic production and business management strategies with “3-I” levels: Intensive, an in-depth level involving immersion in a year-long hands-on training and mentoring program; Intermediate, a mid-level involving participation in a variety of learning activities; and Introductory, a general level where sharing of information is the goal.

The program offers a multi-faceted approach, including classroom and hands-on training, paired with industry mentoring to enhance the sustainability of new and beginning aquaculture/aquaponics and next generation farmers in the Midwest. ABC-2 completed 2018 goals on all the “3-I” levels.

### **Intensive**

Twenty-four monthly informative, educational modules and materials were developed in aquaculture/aquaponics and business/marketing in Ohio and Wisconsin in 2018.

*See ABC Page 20*



*Fast-growing yellow perch created by OCARD.*

# OCARD develops 3 superior strains for aqua-industry

**By Dr. Hanping Wang**  
*Senior Scientist*

Yellow perch, bluegill, and largemouth bass are the top three aquaculture species in the Midwest and North Central Region. Funded by a USDA-North Central Region Aquaculture Center (NCRAC) and NOAA-Sea Grant, the Ohio Center for Aquaculture Research and Development (OCARD) at The Ohio State University South Centers has developed fast-growing strains of these species to meet industry’s needs in the past few years.

### **Larger, Faster-Growing All-Female Yellow Perch:**

Yellow perch females grow significantly faster and larger than males. All-female monosex populations will significantly benefit the aquaculture industry. OCARD at Piketon has created a technology that can generate large numbers of fast-growing, all-female yellow perch populations. A growth performance test of all-females vs. a mixed-sex group showed that all-females grew 26.3% faster than the mixed group, and 66.0% faster than males. In 2018, OCARD created a large number of neomale broodstock of yellow perch with a female genotype. The large numbers of superior neomale broodstock will enable us to produce a commercial-scale of all-female monosex yellow perch. The all-female monosex strain will be available to aquaculture industry in 2019.

*See OCARD Page 20*

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## OCARD from Page 19

### Faster-Growing All-Male Bluegill

Unlike yellow perch, bluegill males grow significantly faster and larger than females. All-male monosex populations are needed by the aquaculture industry. OCARD at Piketon has created a technology that can generate large numbers of fast-growing, all-male bluegill populations. All-male or near-all-male bluegill populations were successfully produced and tested. Results from testing all-male or near-all-male bluegill populations at two locations showed: 1) Weight gain and growth rate of all-male stock were 2.1 times that of regular stocks; 2) All-male groups had significantly uniformed size and lower coefficient of variation; and 3) Survival of all-male groups was significantly higher than that of mixed sex groups due to more uniformed size.



*OCARD-created fast-growing male vs. female in the same family.*

A successful creation of genetically male bluegill strains would have a tremendous impact on the sunfish aquaculture industry by increasing the growth rate of 30-35% and saving energy expenditure by 20-30% for sex growth. In 2018, the aquaculture team at Piketon created a large number of all-male producing broodstock of bluegill, which will enable us to produce a commercial-scale of all-male monosex bluegill. The all-male monosex strain will be available to the aquaculture industry in 2019.

### Faster-Growing Largemouth Bass

OCARD at Piketon genotyped approximately 1,250 largemouth bass in total from 28 populations across the United States. Based on the genetic data and in collaboration with Southern Illinois University Carbondale, we identified a fast-growing strain. We conducted an experiment to compare growth performance of the identified strain vs. an Ohio control group and results showed the fish from the identified group grew 89.5% faster than the control group. The results provide a valuable base for developing fast-growing largemouth bass broodstocks for industry.

*For more information about those fast-growing strains, please visit [cfaes.osu.edu/stories/defying-the-laws-nature](http://cfaes.osu.edu/stories/defying-the-laws-nature).*



*A hands-on training at the hatchery during an ABC-2 session.*

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## ABC from Page 19

Each module was designed to coincide with seasonal activities on a typical aquaculture/aquaponic farm so that a participatory hands-on training event can simultaneously occur each month.

Thirty and 35 new or beginning aquaculture/aquaponic farmers in Ohio and Wisconsin, respectively, were recruited in 2018 to participate in this intensive, hands-on aquaculture production and business training. Twenty-seven new and beginning farmers in Ohio, and 29 in Wisconsin, gained aquaculture/aquaponic production knowledge, business and marketing awareness and understanding, gained new perspectives, learned and practiced skills, and aspired to be more successful after completing the ABC-2 Intensive program.

### Intermediate

We offered ABC-2 Intermediate level in 2018. This less-intensive training allowed participants to choose among the 12 monthly modules and three workshops, one conference, and one bus tour in both Ohio and Wisconsin. Four hands-on farm-based and classroom-based workshops were conducted by ABC- OAA/WAA. More than 200 additional new/beginning farmers in Ohio, and more than 395 in Wisconsin, were trained and mentored through ABC-2 Intermediate.

*See ABC Page 21*



## ABC from Page 20

A total of 198 and 108 people attended the OAA-ABC and WAA-ABC Annual Conferences, respectively. Thirty-one people attended the OAA Annual Bus Tour in Ohio. Forty combined students in Ohio and Wisconsin registered for the ABC-2 Intermediate program to participate in the online learning resources.

### Introductory

Digital recordings of the ABC-2 Intensive training classes and practices were conducted and edited. An ABC-2 website was developed and has links to aquaculture information, podcasts, and updates of ABC-2 activities. Additionally, ABC-2 Introductory provides training and information through facility tours, individual and group counseling, phone, and email. Other than new farmers trained in Intensive and Intermediate programs, 76 people were trained

through field days/farm visits/trips. There were 1,050 people who gained knowledge through visiting the ABC website, 871 people gained knowledge through our emails, and 172 people received support and information through the phone system.

### Internship

The ABC, OAA, and WAA have established an internship program designed to provide apprentice-type training opportunities for new and beginning aquaculture farmers, and give established farmers a chance to mentor newcomers. Eight interns in Ohio and Wisconsin received training through ABC/OAA/WAA internship program in 2018.

### Mentoring Leadership and Guidance

With the ABC program, the OAA and WAA provided mentoring leadership and guidance for new and small rural farmers. The activities included coordinating the ABC-2 mentoring

and internship programs, providing an annual conference and bus tour of aquaculture farms, facilitating cooperation among new farmers and existing farmers, compiling and distributing information on aquaculture/aquaponics for new and small rural farmers, and creating and maintaining the ABC and OAA/WAA websites. ABC specialists worked together with OAA and UWSP/WAA staff to enhance OAA and WAA's website, newsletters, and marketing strategies and opportunities. ABC-OAA's and WAA's annual conferences were organized, and eight issues of aquaculture/aquaponics newsletters were published in Ohio and Wisconsin in 2018.

These achievements were from multi-team efforts by OSU, OAA, UWSP, and WAA. Jordan Maxwell, ABC-2 Program Coordinator, coordinated all the ABC-2 activities in 2018. Matthew Smith, Jordan Maxwell, Brad Bergefurd, Chris Smalley, Christie Welch, Hannah Scott, Ivory Harlow, Brad Bapst, Ryan Mapes, Paul O'Bryant, Dean Rapp, and many non-OSU instructors/mentors taught ABC-2 students in 2018. Duane Rigsby and Sarah Swanson completed video recording and editing for all the classes and workshops and uploaded to the ABC website, and captured pictures of each exciting moment.

### Year 3 Perspective

The ABC Ohio Aquaculture, Business, and Marketing team and OAA have planned to foster more additional workshops, a bus tour, internships, and newsletters available to the Intermediate and Introductory ABC-2 students in 2019. ABC students in the future will plan to visit more aquaculture facilities. The ABC Wisconsin team and WAA have planned to continue all the "3-I" level classes workshops, bus tour, internships, and newsletters available to the Intensive, Intermediate, and Introductory ABC-2 students in Wisconsin in 2019. ABC students in the future will plan to visit more aquaculture facilities.



ABOVE: Lab fish disease examination training during ABC-2.  
LEFT: ABC-2 aquaponic training.

# FISH TALES

## Aquaculture team publishes two books during 2018 with prestigious publishers

Dr. Hanping Wang and his team published two aquaculture books in 2018. The first book is *Sex Control in Aquaculture*, which was published in 2018 by Wiley-Blackwell after three years of planning, coordination, writing, and revising. The second book is *World Perch and Bass Culture: Innovation and Industrialization*, which was written in both English and Chinese and published by China Science Press in 2018. The two books cover principle and practice in sex control and aquaculture of 42 major aquaculture species and provide very useful scientific information for commercial industry, biological sciences, and for aquaculture researchers.

*Sex Control in Aquaculture* has two volumes covering 888 pages. Dr. Hanping Wang, Principal Scientist at the Ohio State University South Centers' aquaculture research center, is the Editor-in-Chief and contributed six chapters to the book. Sarah Swanson assisted in chapter coordination and Bradford Sherman, Joy Bauman, and Jordan Maxwell assisted in English editing. The first comprehensive book of its kind, *Sex Control in Aquaculture*, covers basic theory for sex control and sex control practice in major aquaculture species worldwide. It consists of 41 chapters and the contributors are internationally recognized scientists from around the globe. Sex control and monosex production knowledge and technologies are extremely important for aquaculture professionals and industries to improve production, reduce energy consumption for reproduction, and eliminate a series of problems caused by mixed sex rearing, and for conservationists to control invasive species using a sex control approach. For more information about the book, please visit: <https://onlinelibrary.wiley.com/doi/book/10.1002/9781119127291>

*World Perch and Bass Culture: Innovation and Industrialization* covers recent developments and innovations in genetics and breeding, nutrition, and culture technologies in major aquaculture perch and bass species, such as Chinese perch, largemouth bass, yellow perch, European perch, pike perch, striped bass, and walleye. Perch and bass, belonging to Serranidae, Percidae, Moronidae, and Latidae families of the Perciformes, have worldwide importance as a food and recreational fish. Global production of perch and bass is around one million tons. The economic value of perch and bass is comparable to cold water species salmon and trout. Comparing to the globally

mature aquaculture industry of salmon and trout production, perch and bass are generally suitable for a wide range of rearing areas and are well-suited for commercial production because of their fast growth. Aquacultural production of perch and bass is in the early stages of development and expanding rapidly. Therefore, there is much potential for the expansion of perch and bass aquaculture.





# Climate-Smart Agriculture

## Soil, Water, & Bioenergy program 2018 highlights

**By Dr. Rafiq Islam**

*Soil, Water, & Bioenergy Program Leader*

The overall goal of the Soil, Water, and Bioenergy program at The Ohio State University South Centers is to develop and manage economically viable, environmentally compatible, and socially acceptable climate-smart agriculture. We believe agriculture is an integral component of the solution, and not the problem.

To achieve the goal, the Soil, Water, and Bioenergy Resources program targets local, state-wide, and national farmers (youth and future farmers); agro-business and industry representatives; administrative and elected officials; civic, environmental, and non-profit groups; faculty, research staffs, and educators; state and federal agencies; mass communications and technology; international collaborators and institutions; and sister programs at The Ohio State University.



**RIGHT: SWBR**  
Research Assistant  
Jordan Maxwell  
explains the  
aquaponics system  
during a visit from  
guests from Central  
State University.



### APPLIED RESEARCH AND DEMONSTRATION

#### **1. USDA Land Grant Institution Capacity Building Project on Aquaponics - Role of Water Quality and Soil Health in Sustainable Food Production on Urban Landscapes.**

In this project, The Ohio State University (OSU) and Central State University (CSU) engaged in a collaborative partnership to address the challenge of optimizing water quality and quantity to maximize economically viable fish and vegetable production in aquaponics. The scientists and students at both institutes are investigating (via academic research, Extension, and outreach) whether aquaponics can be combined with water conservation and storm-water management for converting abandoned food deserts into sustainable green environments where communities can thrive again.

2018 was the first experimental year of the project. Dr. Rafiq Islam, Brad Bergefurd, and Matthew Smith are serving as the principal investigators of the project for a period of three years (2018-2021).

#### **2. Mitsui Chemicals, Inc. (Japan) funded a project entitled "Evaluation of Mitsui Chemicals iCAST Crop Cultivation System in Specialty Crop Production."**

We are currently researching to evaluate the performance of 21st Century fertigation (iCAST technology) based on holistic and novel approaches with respect to state-of-the-art climate-smart fertigation techniques (high water and nutrient-use efficiency) to grow agronomic crops (corn and soybeans) in desert and arid conditions under rain-fed and protective culture systems.

**See SOIL Page 24**

## SOIL from Page 23

Results showed that iCAST Technology is 50–60% more efficient in water and nutrient uses than highly efficient current drip systems.

2018 was the third experimental year of the project. Dr. Rafiq Islam and Brad Bergefurd are serving as the principal investigators of the project for a period of four years (2016-2019).

**3. Civilian Research Defense Foundation (CRDF) US-Ukraine Competitive Research program funded a project entitled “Impact of Sustainable Agricultural Management Practices on Soil Quality and Crop Productivity.”**

The goal of the research project is to develop suitable management practices based on novel and holistic approaches of cropping diversity with a plant stress alleviator (aspirin) under continuous no-till to help improve soil health, water- and nutrient-use efficiency, and economic crop productivity with enhanced agroecosystem services. A long-term collaborative research study by US-Ukrainian scientists was established on irrigated lands in the Southern (Kherson) Ukraine and at OSU South Centers.

First year results showed that aspirin significantly increased soybean yield by 14% and improved the nutritional quality of grains. Protein content and nutrient density have increased in response to aspirin application. An international workshop and field day was held to demonstrate the experimental fields and disseminate the results to more than 150 participants including farmers, scientists, students, and policy makers in Ukraine. Drs. Rafiq Islam and Tom Worley, and Alan Sundermeier, from The Ohio State University delivered several presentations. Details on the project events can be obtained from youtube.com/watch?v=86wl4fsDfLM.



2018 was the first experimental year of the project. Dr. Rafiq Islam is serving as the U.S. principal investigator of the project for a period of two years (2018-2019).

**4. USDA NCR-SARE Partnership grant program funded a project entitled “Making Sense of Soil Health Reports – A partnership to develop recommendations for soil health testing and interpretation.”**

Maintaining a healthy and productive soil is the foundation of sustainable agriculture. However, a majority of producers are not clearly informed about the importance of managing soil health. Soil health tests based on different approaches, indicators, tools, and scales offered by several university and private commercial labs often provide conflicting and confusing test results without any realistic interpretations or management recommendations.

**See SOIL Page 25**

### SWBR RESEARCH GRANTS AND EXTRA-MURAL FUNDING (SEVEN GRANTS)

- USDA-Capacity Building Program funded a project entitled “Role of Water Quality and Soil Health in Sustainable Food Production on Urban Landscapes.” 1/2018 -12/2021) \$289,000.
- Mitsui Chemicals, Inc. (Japan) funded a project entitled “Evaluation of Mitsui Chemicals iCAST Crop Cultivation System in Specialty Crop Production.” 5/2016 to 12/2022, \$650,000.
- American Councils for International Education funded a project entitled “Strengthening U.S. and Kazakh Scientific Capacity Through Joint-Institutional Agricultural Teaching, Research, and Outreach Development.” 12/2018 – 11/2019. \$15,035.
- CRDF US-Ukraine Competitive Research program funded a project entitled “Impact of Sustainable Agricultural Management Practices on Soil Quality and Crop Productivity.” 2018 – 2019. \$107,000.
- USDA NCR-SARE Partnership grant program funded a project entitled “Making Sense of Soil Health Reports – A partnership to develop recommendations for soil health testing and interpretation.” 2018 - 2019, \$29,980.
- US State Dept. Mandela Washington Fellowship Reciprocal Exchange funded a project “Training Professionals and Educators on Sustainable Agriculture and Soil Health.” 2018. \$5,260.
- CTTC funded mini-grant project entitled “Gypsum and Cover Crops Effect on Edge-of-Field Phosphorus Loss.” 2018. \$3,000.





## SOIL from Page 24

The goal of this current research project is to develop a set of simple, common, widely applicable, consistent soil biological, chemical, and physical health measurements. This will allow lab technicians, scientists, and farmers the ability to compare these measurements with standard tests, scores, and ranks, and track over time in response to management practices. Currently, we are collecting composite soil samples from long-term experiments and farmer's fields in Ohio, and analyzing them in different labs to select core indicators of soil health.

2018 was the first experimental year of the project. Alan Sundermeier, Vinayak Shedekar, and Dr. Rafiq Islam are serving as the principal investigators of the project for a period of two years (2018-2019).

**5. American Councils for International Education funded a project entitled "Strengthening U.S. and Kazakh Scientific Capacity Through Joint-Institutional Agricultural Teaching, Research, and Outreach Development."**

The goal of this project is to share and exchange the most up-to-date approaches for academic education, applied research, and outreach capacity building between professionals at The Ohio State University and Kazakh National Agrarian University (KazNAU), and to equip the latter with science-based knowledge and tools to strengthen and sustain programmatic development in these areas.

To achieve our project goal with these specific objectives, the following activities will be performed during a one-week visit by the OSU team to KazNAU in the spring 2019. Proposed activities will be thoroughly discussed and planned with KazNAU prior to the visit to maximize productivity and success of the program. Collaboration and dialogue will continue after the visit and focus on strategically building upon the crosscutting discussions, priorities, and foundational trainings having occurred during the visit.

Drs. Rafiq Islam & Renukaradhya Gourapura, and Beau Ingle are serving as the principal investigators of the project for a period of one year (2019).

**6. Soil, Water, and Bioenergy Resources program also conducted and/or maintained several projects on: (1) soil amendments and phosphorus pollution reduction; (2) long-term impact of no-till and cropping diversity on soil health and agroecosystem services; (3) organic production; (4) marginal land and bio-feedstock production.**

### INVENTION AND TECHNOLOGY TRANSFER

A simple and user-friendly field test kit to evaluate soil health for farmers. Licensed by SoilOne Inc. (<http://www.soil1.com>), Springfield, Ohio in conjunction with The Ohio State University Office of Technology and Licensing. 2018.

A farmer's friendly "Soil Organic Matter and Ecosystem Services Calculator (software)." Invention disclosure with The Ohio State University Office of Technology and Licensing. 2018.

## SOIL & WATER | 2018 HIGHLIGHTS

### AWARDS/RECOGNITION

- Certificate of U.S. Special Congressional Recognition for Outstanding and Invaluable Service to the World Community.
- USDA-Borlaug Mentor Award for Burkina Faso.
- OARDC International Research Travel Grant for Burkina Faso.
- US State Dept. Mandela Washington Fellowship Mentor Reciprocal Award.
- Visiting Scholar Award, Chinese Academy of Agricultural Sciences.
- Soil, Water, & Bioenergy Lab listing/recognition by the Food and Agriculture Organizations of the United Nations.

### STUDENTS AND SCHOLARS HOSTED/MENTORED

Dr. Sergiy Lavrenko, visiting scholar, Dept. of Agronomy, Kherson State Agrarian University, Kherson, Ukraine. 9/15/2018 - 11/12/2018.

Prof. Yilmaz Bayhan, Tubitek post-doctoral scholar, Dept. of Biosystems Engineering, Nemek Kemal University, Turkey. 7/10/2017-6/30/2018.

Cai Lejun (Cynthia), Visiting scholar, Sustainable Research Agricultural Technology, Heilongjiang Academy of Agricultural Sciences-Jiamusi Branch, Heilongjiang, China. 11/1/2017-1/1/2018.

### PEER-REVIEWED PUBLICATIONS

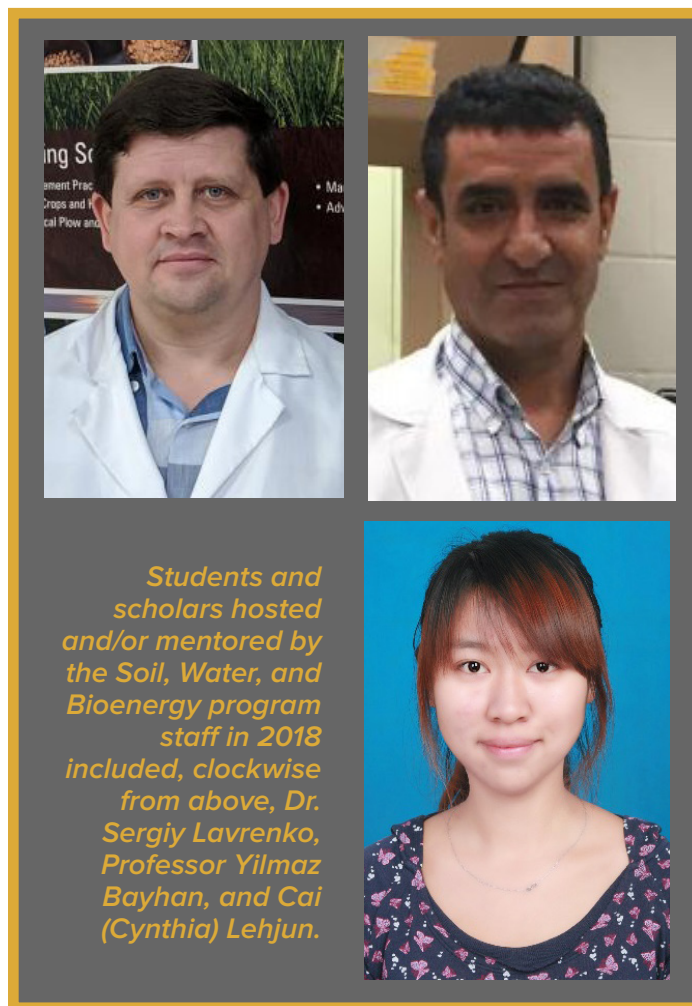
Aksakal, E.L., Barik, K., Angin, I., Sari, S., and Islam, K.R. (2019) Spatio-temporal variability in physical properties of different textured soils under similar management and semi-arid climatic conditions. *Catena* 172: 528-546.

Ortas, I., K.R. Islam (2018) Phosphorus fertilization impacts on corn yield and soil fertility. *Commun. Soil Sci Plant Nutr.* <https://doi.org/10.1080/00103624.2018.1474906>.

Gao, G.Y., Zhou, L., Harker, T., Lewis, W., Slaughter, M.R., Islam, K.R., Xia, Y., and Worley, C.T. (2018) Effects of high-tunnel and tile drainage on the yield and ripening time of mature Northern highbush blueberries in Ohio. *Journal of the NACCA*, 10(2): ISSN 2158-9429.

Batte, M.T., Dick, W.A., Fausey, N.R., Flanagan, D.C., Gonzalez, J.M., Islam, K.R., Reeder, R.C., VanToai, T., and D.B. Watts (2018) Cover crops and gypsum applications: Soybean and corn yield and profitability impacts. *Amer. Soc. Farm Manager Rural Appraisers*. 8: 47-71.

Ibrikci, H., G. Koca, M. Cetin, E. Karnez, Y.K. Koca, C. Kirda, H. Sagir, J. Ryan and K.R. Islam (2018) Considering residual soil mineral nitrogen in corn fertilizer recommendations in an irrigated Mediterranean area. *Commun Soil Sci. Plant Nutr.* 49(2): 202-214.



### PROFESSIONAL WORKSHOP/MEETING ORGANIZED AND /INVITED PRESENTATIONS

21st Century – Climate-Smart Agriculture International Meeting and Field Day, at Institute of Irrigated Agriculture/Askanijske Farm, Ukraine. Sponsored by CRDF, Government of Ukraine, and The Ohio State University, Sep. 11-12, 2018.

Train the Trainer Workshop on “Climate-Smart Agriculture Systems in Ghana. Sponsored by US State dept. Mandela Washington Fellowship Program, CSIR-CRI of Ghana, and The Ohio State University. Kumasi, Ghana. July 2-6, 2018.

Soil Health Workshop in Burkina Faso. Sponsored by The Ohio State University, USDA-FAS Borlaug Program, and INERA-Burkina Faso. Feb 27-Mar 1, 2018.



## SOIL & WATER | 2018 HIGHLIGHTS

### PROFESSIONAL WORKSHOP/MEETING ORGANIZED AND /INVITED PRESENTATIONS (CONT.)

Impact of Sustainable Agricultural Management Practices on Soil Quality and Crop Productivity. Professional presentation at the 21st Century – Climate-Smart Agriculture. International Meeting and Field Day, Kherson, Ukraine, Sep 11-12, 2018.

Advanced Soil Health Training for Farmers and NRCS Professionals. Wenning Farms, Greensburg & Brocks Smith Farms, Vincennes, IN. July 24-26, 2018.

Rethinking Agriculture in the 21st Century: Growing Healthy Food with One Health Vision. Ohio One Health Symposium, Drake Performance and Event Center, The Ohio State University, Columbus, Nov 1-2, 2018.

Jordan Maxwell joined the Soil, Water, and Bioenergy Research team in 2018 as a Research Assistant after spending a little over two years as a Program Coordinator with Aquaculture Boot Camp 2 (ABC-2)



The Ohio State University soil health test service. Farm Science Review, Molly Caren, London, Ohio, Sep 27-28, 2018

Soil quality test – Active carbon. Ohio No-Till Field Day, Wooster, Ohio, August 29.

Rethinking Agriculture in the 21st Century. Professional presentation at CSIR-Crops Research Institute, Kumasi – Ghana, July 6, 2018.

No-Till Cropping Diversity with Cover Crops. Professional presentation at CSIR-Crops Research Institute, Kumasi – Ghana, July 6, 2018.

Sustainable Agriculture Decision Tools (Soil quality test demonstration). Professional presentation at CSIR-Crops Research Institute, Kumasi – Ghana, July 6, 2018.

Brain storming session on current agricultural problems in Ghana. Professional presentation at CSIR-Crops Research Institute, Kumasi – Ghana, July 6, 2018.

Measuring soil health characteristics. In Healthy Soils for Healthy Waters Session, Professional presentation at CTTC Annual Meeting, Ada, OH. March 22-23, 2018.

### PROFESSIONAL SERVICE

#### Academic, Research and Extension Committees

Member, Graduate studies committee, School of Environment and Natural Resources, The Ohio State University.

Member, Midwest Cover Crop Council.

#### Editorial Service

Academic Editor, PLOS ONE

Editorial Board Member, ISRN Agronomy Journal

Editorial Board Member, Journal of Agriculture Food and Development (JAFD)

Editorial Board Member, Botanical Research and Applications

#### Board of Directors

Conservation Tillage and Technology Conference

Ohio No-Till Council

#### Mentor/Supervisor/Technical Review Committee Member

Borlaug Young Scholar Program, World Food Prize

US State Dept. Mandela-Washington Fellowship Program

National Academies of Sciences, Engineering and Medicines.

#### External Examiner for M.S/Ph.D. dissertation

Dmitri Maksimov (2018) The productivity and quality of haricot beans depending on soil tillage, mineral fertilizers and row width under irrigation. M.S. /Ph.D. thesis, Kherson State Agricultural University, Kherson, Ukraine.

Natasha Didenko (2018) Investigation of soybean productivity depending on the main cultivation of soil in the south of Ukraine. M.S. thesis, Kherson State Agricultural University, Kherson, Ukraine.

#### Promotion and Tenure Committee

Dr. Mushtaq Hussain Lashari (2018), Dept. of Life Sciences, The Islamia University of Bahawalpur, Pakistan. External expert evaluation for Assistant professor to Associate Professorship.

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