Soil, Water and BioEnergy Resources Program Highlights Sustainable Agriculture in West Africa

By Yogendra Raut
Soil, Water and Bioenergy Resources Program

While high-input conventional agriculture produces greater amounts of food, feed, energy, and fiber in developed countries, subsistence agriculture in Africa is one of the factors responsible for chronic food shortages. Current practices in both situations are associated with soil health degradation and food insecurity, and contribute to diminished agroecosystem services.

See AFRICA Page 2
Several members of our Soil, Water and Bioenergy Resources Program staff participated/attended 2018 Building Soil Health, Regenerative Agriculture, and Healthy Foods from Healthy Soil sessions of the Conservation Tillage & Technology Conference Annual meeting (CTC) held at Ohio Northern University in March.

The Healthy Soils for Healthy Waters (HSHW) program is a continuation of a series that began in Columbus in 2014. The most recent HSHW programs were in Denver (2017) and Memphis (2016). On the first day, overall topics included Building Soil Health, Regenerative Agriculture, and Healthy Foods from Healthy Soil. Fifteen speakers and panelists included: Barry Fisher (NRCS), David Brandt (Farmer), Rick Cruse (Iowa State Univ.), Rafiq Islam (OSU), David Montgomery, and Britt Burton-Freeman.

Rafiq Islam along with Alan Sundermeier (OSU Wood County Extension Educator) delivered a presentation entitled “Testing and management recommendations of soil health characteristics” on the first day in a two-day session on the Healthy Soils for Healthy Waters at the chapel of the Ohio Northern University. More than 250 people including farmers, educators, consultants, state and federal personnel, students, and non-profit personnel from different states and Canada attended the session. One CCA credit (0.5 for Certified Livestock Manager, CLM and 0.5 for Soil and Water, SW) was by the participating educators for their professional development. Dr. Vinayak Shedekar, along with Alan Sundermeier and others, moderated the HSHW session for both days.

As the threats of climate change are constantly increasing, and in fact, its impact has already shown devastating effects in Africa. The looming prospect of reduced agroecosystem services demands a knowledge-based solution to support sustainable agriculture in Africa.

In light of some of the management practices for developing sustainable agriculture in Africa, Drs. Yogendra Raut, Vinayak Shedekar and Rafiq Islam visited Burkina Faso, West Africa in February and March 2018. Dr. Alimata A. Bandaogo, a Research Scientist from the Institute of Environment and Agricultural Research (INERA) and a former USDA-FAS Borlaug Fellow (mentored by Rafiq Islam) facilitated our visit to Burkina Faso.

We organized two workshops jointly organized by The Ohio State University, INERA, and USDA-FAS Norman Borlaug Fellowship Program; first in Bobo-Dioulasso on February 27 and the second in Ouagadougou (Capital of Burkina Faso) on March 1. Opening remarks were made by the Director-General of INERA-Burkina Faso and a briefing about INERA mission by Drs. Ouedraogo Ibrahima (Regional Director) and Alima Bandaogo, respectively.

The overall methodology of the workshops was based on participatory action research. Interactive presentations were delivered at each workshop highlighting: Rethinking agriculture in the 21st century, Sustainable agriculture decision tools, Soil health test and interpretation, and Forage/pasture and animal grazing – challenges and opportunities in Burkina Faso. Several demonstrations of the soil health test/soil organic matter (SOM) calculator were performed. A participatory brain storming session was conducted at both locations to identify current agricultural problems in Burkina Faso, which were: lack of knowledge of delivery systems (Extension), climate-change and soil quality management practices, water quality and irrigation, and availability of suitable equipment. About 30 participants from INERA, local government, private companies, international donor agency (JICA), and farmers’ representatives at each location participated in the workshops.
Soil, Water and Bioenergy Program Establishes Long-Term Climate-Smart Agriculture Experiments to Help Farmers, Educators in Ukraine

By Rafiq Islam and Wayne Lewis
Soil, Water and Bioenergy Resources Program

Recently, OSU South Centers farm manager Wayne Lewis and Dr. Rafiq Islam visited Ukraine to establish a long-term CLIMATE-SMART agricultural research experiment.

The goal of our research is to develop climate-smart agricultural management practices based on novel and holistic approaches of crop diversification (rotation and cover crops) with plant stress alleviator (salicylic acid) under continuous no-till that helps improve soil quality, water- and nutrient-use efficiency, reduced greenhouse gas emission, and economic crop productivity with enhanced agroecosystem services.

Soil, crop, water, greenhouse gas emission, input, and climatic and economic data will be collected and analyzed to deliver the project outcomes and outputs. Proven traditional and electronic outlets will be used for outreaching Ukrainian clientele (both educators and farmers) to show agriculture is not the problem, but a part of the environmental solution.

The project was funded though the Civilian Research Defense Foundation under US-Ukraine Research Collaboration. Rafiq Islam the US Principal Investigator and Dr. Natalia Didenko is the Ukrainian Principal Investigator for the project.

The Soil, Water and Bioenergy Resources Program is conducting the field research in conjunction with scientists from the Institute of Water Resources and Land Management (Ministry of Agriculture), Institute of Irrigated Agriculture, Askaniya State Agricultural Experimental Station, and Brylivske state farm. Professor Vozhehova R. Anatoliivna (Director), Dr. Maliarchuk M. Petrovich (Main Scientific Researcher), Maliarchuk A. Sergiivna (Senior Researcher), and Biliaeva I. Mykolaivna (Department Head) from the Institute of Irrigated Agriculture; Melnik Andrej (Chief Agronomist), Nadia Reznichenko (Scientific Secretary), Vira Konavalova (Junior Scientist), Natalia Galchenko (Director), Victor Naydenov (Director), Oleksandr Knyazev (Chief of Laboratory of Agrotechnology), Tetyana Levenec (Junior Scientist), and Sergij Roj (Junior Scientist) from the Askaniya State Agricultural Experimental Station; and Cherevychnyj

Dr. Natalia Didenko and Wayne Lewis are pictured speaking to the staff of the Askaniya State Agricultural Experimental Station. Photo By Rafiq Islam.

Yurij (Head of the Research Fields) and Kiberlenko Ivan (Director) of the state farm Brylivske, will be working with us as members of the team.

As part of the research activities, both Rafiq Islam and Wayne Lewis delivered presentations and conducted interactive discussions on no-till system, mono-cropping with corn or soybeans, corn-soybean-wheat cropping diversity with summer and winter cover crop blends maintain soil moisture, control weeds, provide home-grown nitrogen, reduce soil compaction, and improve soil quality. They also discussed the effects of salicylic acid on improving the drought tolerance capacity of crops. Both demonstrated to their Ukrainian collaborators how to measure compaction, soil pH, moisture content, and soil quality in the field using simple equipment and the OSU Soil Quality Field Test Kit.

Finally, the field experiment was established to test 2 tillage systems x 2 cover crops x 2 salicylic acid treatments with three replications on 45 acres of irrigated lands at the “Askaniya” State Agricultural Experimental Station and state farm “Brylivske” under in Kherson Oblast, Southern Ukraine.
From Farm to Cafeteria to Field:

THE CFAES CENTER FOR COOPERATIVES GUIDES NATIONAL FARM TO CAFETERIA CONFERENCE TOURS

By Ivory Harlow and Hannah Scott  
*CFAES Center for Cooperatives*

The 2018 National Farm to Cafeteria Conference brought together educators, dieticians, foodservice staff, farmers, and local food advocates from across the country in Cincinnati, Ohio in late April. Attendees discussed how Farm to School initiatives enrich their communities, strengthen the food system, and boost local economies. Conference sessions shared best practices to boost local food consumption in the cafeteria and provide agriculture, food, health, and nutrition education to students.

The conference featured field trips to several Ohio food and farm destinations. The CFAES Center for Cooperatives guided tours “From Garden to Food Hub” and “The Science of Local Food” at the Ohio State University South Centers.

On the conference’s final morning, 20 conference attendees boarded the bus for a 2-hour scenic trip from the conference center in Cincinnati to OSU South Centers in Piketon. They participated in the award-winning food science program “The Story of the Strawberry.” The program is a partnership between OSU Extension Pike County, OSU Horticulture, and OSU Food, Nutrition, and Wellness.

See FARM TO CAFETERIA Page 5
Islam serves as NASEM/NRC technical review committee member

By Rafiq Islam

Soil, Water and Bioenergy Resources Program

Rafiq Islam participated at The National Academies of Sciences, Engineering and Medicine (NASEM)/National Research Council (NRC), as a technical review committee member, to review and select NRC post-doctoral fellowships.

The NASEM/NRC are one of the top ranked scientific and research organizations in the United States. The NRC annual technical review committee meeting was held at the Beckman-Marble Center, University of California-Irvine on March 12 and 13. About 100 scientists and faculty members were invited from universities all over in the United States to participate in the two-day rigorous review process.

The review process was performed to select most outstanding Ph.D. graduates worldwide in the field of Earth Science, Life Science, Chemistry and Physics, and Mathematics and Engineering fields.

Three eminent reviewers reviewed each proposal and credential submitted by the applicants. About 100 post-doctoral fellowships are offered annually to the outstanding candidates working in the U.S. government-sponsored laboratories on state-of-art cutting-edge research priorities.

On behalf of The Ohio State University, Rafiq Islam has been serving as one of the technical review committee technical members in the field of Earth Science since 2014. He, along with other members, reviewed more than 30 proposals on Earth Science research in 2018.

The NRC annual technical review committee meeting was held at the Beckman-Marble Center, University of California-Irvine on March 12 and 13. About 100 scientists and faculty members were invited from universities all over in the United States to participate in the two-day rigorous review process.

The unique challenges of moving locally produced food from farms to restaurants, cafeterias, and retailers have been a focus of the Center for Cooperatives since 2014 through the Ohio & West Virginia Food Hub Network and technical assistance work with food hubs. According to a recently released study from Michigan State University’s Center for Regional Food Systems and Wallace Center at Winrock International, approximately 31% of U.S. food hubs marketed products to K-12 schools in 2017. Despite challenges, food hubs can help producers access larger markets than they may be able to working on their own. In 2017, approximately 18% of food hubs in the U.S. were cooperatively owned.
2018 is off to a good start for the Endeavor Center business incubator. The center operated at nearly a 100% occupancy rate in first two quarters, having only one space available for lease. A new partner application was recently approved and a start-up health coaching business will take possession of that office next month. There has also been much activity and many visitors through the doors. We have hosted many training events and business meetings while continuing to receive requests to schedule meeting space at later dates. In summary, there are 18 (soon to be 19) partner companies that occupy 26 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 Small Business Development Center (SBDC) continues to grow with its success in assisting businesses achieve their goals. 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.

Regional partnerships are the primary source of referrals for SBDC at the OSU 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. The 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.

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 email bapst.4@osu.edu.
Lumber Grading Training

In 2011, Ohio’s forest products industry, encompassing forestry and logging, wood products manufacturing, paper manufacturing, and wood furniture manufacturing, employed approximately 47,200 people, created $4 billion of labor income, and produced outputs of approximately $13.6 billion (Coronado et al 2015).

The Southeast region, which encompasses many of Ohio’s Appalachian counties, contains the most intensive primary processing of forest products in the state and the highest concentration of sawmills producing greater than 5 million board feet of lumber annually (Coronado 2015). According to an analysis by Michaud and Jolley (2016), the Appalachian region of Ohio is home to over 60% of the state’s sawmill employees, which contributed approximately $711 million to the region’s economy.

The importance of the forest and wood products industry to the region prompted the OSU South Centers Business Development Network, in conjunction with the Manufacturing Extension Partnership and National Hardwood Lumber Association (NHLA), to host a Lumber Grading Short Course in April.

Fourteen participants in the NHLA-taught courses learned the basics of hardwood lumber inspection and received hands-on grading training; skills that will help them as they pursue opportunities across the forest and wood products industry, or work to improve their company’s processes and valuations in order to become more profitable.

Most of the course participants were current employees of local lumber businesses; however, a few of the attendees were local high school students and support organizations interested in the forest and wood products industry as a career opportunity or knowledge enrichment. Participants who successfully completed the course received the NHLA lumber grading certification; a certification that is highly regarded in the lumber industry.

The success of the course has prompted the OSU South Centers Business Development Network to make plans to continue to offer the course annually.

Manufacturing Extension Partnership

The Ohio State University Center for Design and Manufacturing Excellence, the Manufacturing Extension Partnership affiliate in southern and southeast Ohio, partnered with OSU South Centers to host a Lean Training event in the Endeavor Center on April 17. Scioto Productivity Solutions provided the training and there were 12 attendees who participated.

During the day-long event, the trainer covered topics such as introduction to Lean, basics of TPS, history of TPS, tools, how-to implement, keys for small business, leadership, and Six Sigma, as well as incorporating several hands-on activities to bring the training to life.

Attendees will be able to return to their companies with a tremendous conceptual understanding of Lean, begin basic implementation, and also be in a great situation to receive additional training at their company site for a more in-depth, comprehensive Lean program. This additional implementation can also be provided by CDME/MEP as a service to the company.

Aquaculture Boot Camp 2018

Due to adverse weather in January, Aquaculture Boot Camp II was postponed until February, when we met our 34 recruits and went over the yearlong agenda on which they were about to embark. Throughout the year we plan to continually work with these attendees in, not only the technical side of an aquaculture/aquaponics operation, but also the business side.

It is our mission to help them reach their business goals by assisting with development of business and marketing plans, as well as financial projections they can take from the session and determine if this is a viable business for them. Like with any other business in which we work, we hope to better educate and help form a plan prior to jumping in and not realizing what all may or may not be involved. Each month we will have a business session focusing on important aspects that come with starting and successfully running a business. We also will meet with clients on a one-to-one basis in order to dig deeper into their business ideas and answer questions that pertain to their differing situations.
OSU South Centers and University of Rio Grande Telecasts

Mr. Joe Perkins, owner of Perkins Community TV in Youngstown, Ohio and Shane Reinhert of Anderson Community TV in Cincinnati, Ohio are now replaying OSU / URG Telecasts that are aired each week on Wednesday afternoons and Thursday mornings. These telecasts encompass 28 - 30 different half hour broadcasts each month, are live-streamed, and are saved on OSU South Centers and University of Rio Grande YouTube channels. Many Telecasts are also aired on Rio Grande Cable Access TV. There are 6-9 different telecasts each week.

Viewers can easily see the telecasts by visiting go.osu.edu/osusc and go.osu.edu/riogrande.

Formats of the telecast follow a Public Access TV format, providing educational programming geared to persons in the fields of agriculture, banking and economics, arts, museum, community, tourism, sports, health, technology, business, and organizations.

SWBR PROGRAM HELD AT THE INTERNATIONAL CONFERENCE ON FOOD AND AGRICULTURE IN INDIA

Vinayak Shedekar
Soil, Water and Bioenergy Resources Program

The Second International Conference on Food and Agriculture was held at Dhanbad, Jharkhand (India) during March 29-31, 2018. Dr. Vinayak Shedekar, Research Associate-II with the Soil, Water, and BioEnergy Resources (SWBR) Program was among the three Ohio State University delegates who organized a 2-day special session on “Climate-smart Agriculture” (CSA). Dr. Bryan Mark, State Climatologist of Ohio and Dr. Asmita Murumkar, Post-doctoral Researcher in the Department of Food, Agricultural and Biological Engineering joined Shedekar.

The session featured talks from experts, educators, and representatives from non-profit organizations relating to the development of climate-smart agricultural systems, tools, crops, and communities.

The speakers presented topics such as role of youth in climate change adaptation, climate change assessment, and climate-smart technologies, among others. The session kicked off with Dr. Bryan Mark’s presentation that highlighted the framework for climate change assessment, adaptation, and mitigation in USA and India. Dr. Asmita Murumkar delivered a talk on assessing climate change impacts. Vinayak presented use of decision tools for climate-smart agriculture. Two presentations on developing climate-smart crops were another highlight of the session.

Dr. Ismail Dweikat, Professor in the Department of Agronomy and Horticulture at University of Nebraska-Lincoln, presented his research on developing drought tolerant crops in response to changing climate. The presentation highlighted sorghum and pearl millet as alternative crops that can be grown in deficit-irrigated or water scarce regions.

The CSA session concluded with an expert panel question-answer session, which ranged from scientific queries to extension and outreach related questions.
Ohio Hops growers experienced continued strong market demand in 2017 for locally grown hops, with many reporting being sold out before the end of 2017, and the demand is not likely to decline soon with almost 300 breweries operating (or soon to be) in Ohio.

The Ohio State University South Centers, in cooperation with the Ohio Hop Growers Guild for the fifth year in a row, held another sold-out Ohio Hops Conference and Trade Show at the OSU South Centers at Piketon on March 23 and 24. The goal of the event was to help new and experienced growers learn the newest hop production techniques, and network with over 200 hop growers in attendance, as well as 20 hop industry vendors and exhibitors, who showcased the latest in hop technology and innovations.

This year’s Conference included an Ohio brewers panel, whose members either currently are, or are interested in, purchasing Ohio-grown hops. These brewers included A Butcher and a Brewer from Cleveland and the Portsmouth Brewing Company from Portsmouth. The panel included a tasting of Ohio beers brewed with state-grown ingredients.

For the first time, we incorporated a bus tour to southern Ohio hop farms, which included the only certified organic hop farm in Ohio and a tour of a newly constructed and operating hop processing, drying, pelletizing, and packaging operation in Georgetown. Attendees were able to tour the hop fields of these growers and gain knowledge from them on various techniques for growing this specialty crop.

The event also featured hop experts with Ohio State University Extension, OARDC and OSU South Centers, University of Kentucky, Michigan, and other agriculture industry professionals. Attendees also participated in hands-on field training and activities in the hop yards at the South Centers. These trainings included drip irrigation design, trellis construction, mobile drying, mechanical harvesting, and fertigation techniques.

For more information on the Ohio Hops program and the 2019 Ohio Hop Conference, contact Brad Bergefurd at 740-289-2071, ext.136 or bergefurd.1@osu.edu, or Charissa Gardner at 740-289-2071, ext. 132 gardner.1148@osu.edu.
But Sherman is no stranger to Ohio State, either. After exiting the journalism field, he joined the university in June 2015 as a 50 percent FTE Office Associate at the Jackson County Extension office. It was there that he learned what it meant to be a Buckeye, and decided that he wanted to turn that part-time job into a new career.

“I love working at the Ohio State University; it became apparent to me very quickly that I wanted to spend the rest of my working years here,” said the 39-year-old.

Sherman, who is originally from Oak Hill, earned a Bachelor of Science Degree in Communications from the University of Rio Grande in 2002. As a college student, he worked as an intern producing newsletters for senior citizens in Gallia County, and in the news department at WKOV radio in Jackson.

Sherman and his wife, Melanie, reside in Jackson with their two children, daughter Celyn and son Cuinn.
However, this method is quite cumbersome since row covers may still need to be put on and taken off multiple times. Dr. Gary Gao, Extension Specialist and Associate Professor at OSU South Centers, learned one neat trick from a company in Holland at the North American Bramble Growers Association’s Annual Meeting; Instead of covering the potted blueberry bushes with row covers, the blueberry containers are buried in preformed raised beds. Half of the pots are buried in the raised beds. We are going to test this method in 2018 and beyond. Hopefully, we will have a truly viable blueberry production system without soil acidification in Ohio.

Hardy Kiwis and Hardy Figs in Ohio

Our research team members are quite busy planting many different fruit crops, such as hardy kiwis and hardy figs. We are very excited about these two crops as potential cash crops for Ohio. As with many new or rare crops, growers should be cautious and do their homework before they plant a lot of them. Stay tuned for more information.

Blueberry Rootstocks

Ryan Slaughter, Lijing Zhou, and Jiangbo Fan have made trips to Indiana and/or Missouri to collect sparkleberry (Vaccinium arboreum) plants and cuttings for our blueberry grafting study. I do not know how many of you have gone to the woods to collect wild specimens; both Ryan and Lijing found out what its like when they went to a national forest in Indiana. Well, Ryan and Jiangbo had a taste of it in Missouri too ... the woods in Indiana take the cake, though.

Fruit Extension Programs

We offered two major extension programs during the last six months or so. These were the Ohio Grape and Wine Analysis Workshop in December, 2017 and the Ohio Cane Berry and Wine Grape Pruning Workshop in March. Both programs were well received by the attendees. Dr. Gao also gave presentations at the 2018 OPGMA Connect, Ohio Grape and Wine Conference, and Southwest Ohio Fruit and Vegetable (Specialty) Crop Conference, as well as fruit training programs in Athens, Delaware, and Ross Counties.

Acknowledgements: We would like to thank Ohio Department of Agriculture and USDA Agricultural Marketing Services for their financial support of research projects and extension program through several Specialty Crop Block Grants.
Local food producers and buyers had the opportunity to come together to network, learn from each other, and make connections—all in the name of helping citizens through increased access to Ohio produced foods.

Beginning with a locally sourced breakfast consisting of sausage, bacon, eggs, milk, yogurt, granola, coffee, and baked goods, The Appalachian Table helped to raise awareness among producers and buyers about the diversity of local foods produced in the region, and the diversity of opportunities to sell to various markets.

Leslie Schaller, a founding member of Casa Nueva, shared experiences about sourcing local foods for her restaurant and value-added line. Highlighted were some of the logistical challenges of sourcing locally produced foods, accessing the ability to process those items, and then store them for year-round use in the restaurant. Casa Nueva is an Athens, Ohio based, worker-owned cooperative restaurant that sources as much locally produced food as possible.

Sandra Gross, co-owner, and Frances Kroner, Executive Chef of Sleep Bee Café, shared information about their restaurants and working with local food producers.

See TABLE Page 13
They source as much locally produced foods as possible and then create seasonally inspired meals that are served in their Cincinnati area cafés. Local producers appreciated their willingness to share about their process and learned from the success they shared.

Attendees also heard from a panel of producers that currently sell their locally produced products via various market channels: McDowell Farms selling to a regional grocer, Way Farms sells via a farm market and farmers markets, and Two Roasting Joes sells via farmers’ markets and specialty stores. Attendees were able to ask these producers about the challenges and opportunities of the various market channels they currently use. One participate said that, “learning firsthand what restaurants and wholesale customers want from producers and how they want to be contacted” was very beneficial.

Participants also appreciated the knowledge of the many resources that are available to help them grow their businesses. Collaborators for the program included the OSU Extension Direct Food and Agriculture Marketing Team, The CFAES Center for Cooperatives, The Minority Business Assistance Center, The OSU South Centers Business Development Network, and The Appalachian Center for Economic Network (AceNet).

If you would like additional information about direct marketing locally produced food and agricultural products, the OSUE Direct Agricultural Marketing Team would like to help. You can visit our website at southcenters.osu.edu/marketing or email welch.183@osu.edu for more information.

ABOVE: A locally sourced breakfast consisting of sausage, bacon, eggs, milk, yogurt, granola, coffee, and baked goods welcomed attendees at The Appalachian Table.

LEFT: Christie Welch speaks to attendees during the event.

Attendees also heard from a panel of producers that currently sell their locally produced products via various market channels.
Year 2 of Aquaculture Boot Camp-2 is off to a strong start in Ohio, Wisconsin

By Dr. Hanping Wang
Senior Scientist
and Jordan Maxwell
Program Coordinator

The OSU South Centers, in partnership with OAA and University of Wisconsin–SP, have successfully started the second year of Aquaculture Boot Camp-2. 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. In 2018, we are running parallel 3-I level (Intensive, Intermediate and Introductory) ABC Programs in Ohio and Wisconsin.

Ohio:
The ABC-2 2018 Intensive class consists of 35 highly motivated fish farmers and aquaponics producers from across Ohio and West Virginia. The individuals selected consist

business collaborators an in-depth look into aquaculture/aquaponics production planning, business plan structures, and market identification. The students toured the OSU South Centers’ newly updated aquaponics system and aquaculture research facility, where they will be actively involved throughout the year.

In March, ABC-2 students traveled to Fresh Harvest Farm, owned by Doug and Jeni Blackburn, for a tour of their aquaponics facility and a full day of learning. Matthew Smith, aquaculture extension specialist, covered key principals of aquaculture and aquaponics in the morning while guest speaker Brad Bergefurd, horticulture specialist at the OSU South Centers, taught plant selection and considerations in aquaponics. The afternoon breakout sessions focused on harvesting, packaging, legal considerations in aquaponics, and system components and construction, as well as successful fish husbandry practices.  

See ABC-2 Page 15
In April, the third session held at the OSU South Centers combined business and biology. Hannah Scott, the CFAES Center For Cooperatives manager, gave an overview of cooperatives and their structure, while Brad Bapst, the Small Business Development Center Director, dove into cash flow. The afternoon breakout sessions offered the students a hands-on opportunity to learn about yellow perch spawning, artificial fertilization, egg ribbon incubation, fry estimation and stocking, and pond fertilization instructed by South Centers aquaculture research staff members Paul O’Bryant and Dean Rapp. Matthew Smith introduced RAS and Biofiltration to the students and walked through the South Center’s aquaponics system design.

The OSU South Center ABC-2 team has a plan for future sessions throughout the year and looks forward to bringing the ABC students the most up-to-date industry information and practices.

**Wisconsin:**

An extensive Aquaculture/Aquaponic Boot Camp-2 agenda was developed with 12 workshops to be offered during 2018. Thirty-six applicants, all interested in starting an aquaculture or aquaponics business, were selected to participate in the ABC-2 Intensive program. Attendance at the first four workshops has been around 90% with each participant also developing a pilot project that they discuss at each workshop. Final project presentations are scheduled for January 2019.

Three of the four business and marketing workshops have been scheduled or took place in 2018. At the March 3 ABC-2 Intensive workshop, presentations were given by the WI Small Business Development Center, where assistance by the Center was discussed in addition to an introduction to marketing and how to access publicly available marketing research/data.

On August 13-15, the University of Wisconsin-Stevens Point (UWSP), Nelson & Pade, Inc. (NPI), and the Wisconsin Aquaculture Association (WAA) will host a three-day workshop that will focus on the fundamentals of aquaculture/aquaponic business and marketing. Attendees will be introduced to small business concepts and how to navigate the myriad of rules, regulations, permits, business and loan applications, and zoning and marketing approaches.

Following that event, on August 18, a business and investment opportunities in aquaponics workshop will be hosted and provided by NPI. This will be a one-day course for entrepreneurs, investors and individuals interested in starting an aquaponics business. The course will focus on the start-up, planning, operation, economics, marketing, profitability, ROI, and business models for commercial aquaponic ventures.

The WAA, NPI and UWSP Aquaculture/Aquaponic programs selected six interns and paired them with established farms. The established farms have entered into a cost-sharing agreement with UWSP and have developed a rigorous, yet well-defined educational and training program for the interns. Each internship is taking place from May 29 – August 31, 2018 and is allowing the interns to apprentice and learn important aquaculture/aquaponic information provided by the producer, who also serves as the intern’s mentor. The UWSP aquaculture/aquaponic websites (aquaculture.wisc.edu and www.uwsp.edu/aquaponics) and Facebook pages are being used to distribute information on aquaculture/aquaponics for new and small rural farmers. Support is being given to the WAA to update their website (www.wisconsinaquaculture.com) and NPI recently updated their website (www.aquaponics.com) to be more user friendly and contain updated information.

Discussion and initial plans have been developed to update the WAA newsletter, The Creel. ABC-2 intensive training and workshops are being digitally recorded and uploaded to the UWSP ABC-2 website (https://www.uwsp.edu/cols-ap/nad/Pages/Aquaculture-Boot-Camp.aspx) and will also be made available through the OSU ABC-2 website (https://southcenters.osu.edu/aquaculture/aquaculture-boot-camp).

On March 2-3, UWSP and WAA co-hosted the Wisconsin Aquaculture Conference in Marshfield, WI with the conference theme of “Aquaculture 2018: Strength in Numbers – Building the Industry with Collaboration, Training and Education.” The focus of the presentations was to combine private and public aquaculture/Aquaponic operations in an effort to share their experiences for new and limited resource farmers. Also, six interns are being mentored at aquaculture/aquaponic facilities in 2018. A bus tour of a variety of aquaculture and aquaponic businesses is scheduled for August 2018.

For more information about ABC-2, please contact Ms. Jordan Maxwell, ABC-2 Program Coordinator, at maxwell.411@osu.edu.
Defying the Laws of Nature

Breeding for Faster-growing Bluegills and Yellow Perch

By Alayna DeMartini

PIKETON — Inside cool water-filled fish tanks in southern Ohio, the laws of nature are being defied: Female yellow perch mate with other female yellow perch; male bluegills with other male bluegills.

This might make you wonder, unless, of course, your profession is selective breeding of fish, and your goal is to get them to grow faster. Hanping Wang, who manages The Ohio State University's Ohio Center for Aquaculture Research and Development, has succeeded in raising faster-growing fish by artificially mating them in a not so typical way.

On average, the resulting offspring reach market size six months faster than bluegills or yellow perch bred out of standard male-female mating. That’s because among yellow perch, females grow quicker than males; among bluegills, males faster than females.

For an Ohio fish farmer, having fish that mature faster than average could be a significant savings in fish food and in time waiting to sell them, said Wang, whose center in Piketon is part of Ohio State’s College of Food, Agricultural, and Environmental Sciences (CFAES). The aim of the center is to spur the state’s aquaculture industry, in part through research on two of the state’s most common fish: yellow perch and bluegill.

Aquaculture, the practice of raising fish in a controlled environment of indoor tanks or outdoor ponds, is slowly growing, but still a relatively small Ohio industry. In 2017, 227 people in the state had permits allowing them to sell seafood. Any advances in farming that make it faster or easier to raise fish or shellfish could prove useful and profitable.

See LAWS OF NATURE Page 17
We’re using the animals’ maximum potential to make them grow faster for human benefit,” Wang said. “We have to do it this way to meet the growing need for food, specifically protein. You need to have a process to produce more animals — more chickens, cows, pigs and fish.”

Creating Larger, Faster-Growing Yellow Perch

Among yellow perch, the females grow 60 to 70 percent faster than the males, and they grow larger than the males. As a result, it makes sense that a breeder would want to produce the fastest-growing female yellow perch. So Wang did exactly that. He mated females to females with the help of grants from the U.S. Department of Agriculture and the state-based Ohio Sea Grant program, which funds research in the Great Lakes and aquaculture.

While they remained females at the chromosome level — possessing the XX chromosome pair as opposed to the XY chromosome pair that typical males have — they still were able to produce sperm. That allowed the females to mate with other female yellow perch. It might sound odd, perhaps, but it worked. The results were “neo-males,” or “pseudo-males,” as Wang calls them.

The offspring produced by the mating of a neo-male with a standard female yellow perch were all females, since there was no Y chromosome in the mix. And the female offspring grew as expected, 60 to 70 percent faster than any female offspring born out of the standard arrangement of a male and female mating with each other.

On average, it takes a farmer 16 months to raise a yellow perch to reach market size. Now it can take as little as 10 months if neo-males are mated with typical female yellow perch, Wang said.

“The farmer saves on labor, saves on feed and saves on space,” he said.

Speeding up bluegill Growth

With bluegills, the males grow faster and bigger than the females. So, Wang took males and mated them with males through a process similar to what was done with the yellow perch, so they became what Wang calls “neo-females.” The offspring of a neo-female bluegill and a male bluegill were all male fish that could grow to 1 pound, the size needed to sell them, in about a year, cutting three to five months off the typical time needed for them to mature.

Whether bluegills and yellow perch can be made to grow even faster is uncertain.

“We don’t know,” Wang said. “We’re working on that.”

Standard Mating

Along with mating females with females and males with males, Wang and his colleagues have conducted standard mating with yellow perch to generate the fastest-growing males and the fastest-growing females.

They began with 800 yellow perch, 100 taken from eight states in the Midwest and Northeast, including Ohio. The DNA of the fish was analyzed, then the fish that were related were put in different tanks to prevent the possibility of them mating. Each fish was placed in one of a series of tanks with males and females, and they were allowed to mate as usual, males with females.

From the first round of babies, the scientists selected the 200 fastest-growing male and female fish from each cohort — then those pairs mated, and the same process occurred over and over to get genetically improved fish.

Across the three sites, and on average, the improved fish grew 35 percent faster than the unimproved fish, meaning the ones whose parents came together naturally without any special mating arrangements.

Not only do they grow 35 percent faster, they have a higher survival rate, 20 percent higher.

“It doesn’t matter if it’s a fish or a tomato or a soybean, if you can shorten the amount of time it takes to grow the item to market size while still maintaining the same nutritional quality, that will just improve the farmer’s profit margin,” said Matthew Smith, an OSU Extension aquaculture specialist. Smith’s main priority is expanding sustainable, profitable fish farms in Ohio. OSU Extension is the outreach arm of CFAES.

Aquaculture can play a critical role as our oceans and Great Lakes are overfished, Smith said. “It’s a way to provide a balance,” he said.

See LAWS OF NATURE on Back

The Ohio Center for Aquaculture Research and Development provides research and outreach to promote and expand the aquaculture industry in Ohio and beyond. (Photo: Ken Chamberlain, CFAES.)
It seems there might be a downside to unnaturally mating fish, but Wang says that’s not the case. The practice of mating females together or males together might be unusual but does not produce problem fish – that is, assuming no relatives are mated with each other, Wang said.

And the good news for fish farmers or aspiring fish farmers is that the neo-male yellow perch, the neo-female bluegill and the yellow perch that were improved to grow faster will eventually be put on the market for fish farmers and for stocking in ponds.

Hanping Wang and his team of researchers completed the genome sequencing of yellow perch and bluegill. (Photo: Ken Chamberlain, CFAES.)

Critical to the selective fish breeding program is a key accomplishment of Wang’s research team: Completing genome sequencing of both yellow perch and bluegills. That may not sound like a huge feat to someone outside the aquaculture world. After all, fish have far fewer genes than humans. But knowing the genetic makeup of these two species makes it possible to see how genes interact with each other and to examine the exact gene that controls economically important traits in the fish, such as the pace of growth and disease resistance.

By changing the genetic makeup of the fish, researchers can select for high disease resistance and larger, faster-growing fish, Wang said.

“We know long term it will have a huge impact.”

Wang has also authored a book on selective fish breeding that will be available this summer.