

2017 Annual Report

April, 2018



31 international agreements
with institutions in
19 different countries

412 international interns and
trainees placed from
40 countries

6th ranked U.S. institution in
number of alums serving as
active Peace Corps volunteers

219
international students
enrolled in CFAES

19 Distinguished International
Scholars hosted through the U.S.
Department of Agriculture
Scientific Exchange Programs



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

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2017 International Programs Highlights

Around the World with CFAES



In 2017, CFAES continued its commitment to global engagement through teaching, research, and outreach. CFAES is also impacting food security, environmental sustainability, and human health and wellness on a global scale.

EDUCATION ABROAD

01 Australia	10 Iceland
02 Brazil	11 Netherlands
03 Costa Rica	12 Germany
04 Czech Republic	13 Belgium
05 Dominican Republic	14 New Zealand
06 England	15 Nicaragua
07 Scotland	16 South Africa
08 Ghana	17 Spain
09 Honduras	18 Tanzania

STRATEGIC COUNTRIES

A. Brazil	E. Ethiopia
B. China	F. Kenya
C. India	G. Tanzania
D. Ukraine	

PROGRAMMATIC FOOTPRINT

- Innovative Agricultural Research Initiative (iAGRI) in Tanzania
- Integrated Pest Management Innovation Lab
- Fulbright U.S. Scholar Program
- USDA Norman E. Borlaug International Agricultural Science and Technology Fellowship Program
- Norman E. Borlaug Leadership Enhancement in Agriculture Program (Borlaug LEAP)
- Borlaug Higher Education for Agricultural Research and Development (BHEARD) Program
- U.S. Borlaug Fellows Program
- Faculty Exchange Program
- USAID Farmer-to-Farmer Program
- Higher Education Funding Commission of Pakistan
- USDA Cochran Fellowship Program
- USDA Scientific Cooperative Exchange Program

Office of International Programs in Agriculture

Mission Statement

The mission of the Office of International Programs in Agriculture is to support the globalization efforts of the college by engaging Ohio State faculty and students in international research, outreach, and learning. Employing the land grant model, we work with international partners to build capacity in sustainable agriculture throughout the world and to increase competitiveness at home.

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The Office of the International Programs in Agriculture was established in 1955 to foster international outreach and engagement in the College of Food, Agricultural, and Environmental Sciences at Ohio State.

What We Do

We promote global opportunities within the College, with an emphasis on the developing world, by...

- ... assisting faculty and researchers with the submission and administration of international grants and contracts,
- ... managing short-term scientific exchange programs for international visitors and scientists,
- ... implementing degree programs for international graduate students,
- ... supporting recruitment efforts for the Peace Corps on Ohio State's campus,
- ... coordinating the writing and approval of memoranda of understanding between college units and international institutions,
- ... and guiding the placement of international students in internships within the private sector

Who We Work With

- Administrators, faculty, staff, and students in the College of Food, Agricultural, and Environmental Sciences, the Ohio Agricultural Research and Development Center, and Ohio State Extension
- Office of International Affairs, Global Gateway Office, and the area study centers
- Office of Research – Office of Sponsored Programs
- College of Veterinary Medicine, College of Education and Human Ecology, Fisher College of Business, and other Ohio State academic departments and units
- United States Department of Agriculture (USDA)
- U.S. Agency for International Development (USAID)
- USAID Missions and U.S. Embassies
- Strategic international partners and higher education institutions
- Other U.S. Land Grant Universities
- Association of Public and Land-grant Universities, Association for International Agriculture and Rural Development, and Association for International Agricultural and Extension Education.



Innovative Agricultural Research Initiative

The Innovative Agricultural Research Initiative (iAGRI) is a \$25.5 million Feed the Future project funded by the United States Agency for International Development (USAID) and is managed by the Office of International Programs and Agriculture at The Ohio State University (OSU), which coordinates its activities with the Project Management Unit located at the Sokoine University of Agriculture (SUA) in Morogoro, Tanzania.

iAGRI was launched in March 2011 as a five-year project. In May 2015, it was extended to a total of six years and in January 2017 for another six months for a total of six and a half years. This enabled OSU and five other participating U.S. land-grant universities to continue the critical capacity-building efforts with their institutional partners in Tanzania -the Sokoine University of Agriculture (SUA) and the Ministry of Agriculture, Livestock, and Fisheries (MALF).

Staff from Ohio State's College of Food, Agricultural, and Environmental Sciences (CFAES) involved in the project include Mark Erbaugh, Project Administrative Director; David Kraybill, Project Director in Morogoro, Tanzania, and Professor in the Department of Agricultural, Environmental, and Development Economics; David Hansen, Project Coordinator; Wendi Howell, Training Coordinator; Poppy Thornton, Administrative Assistant; and David Mackie, Fiscal Manager.

The iAGRI project formally concluded in August 2017. Collaborative engagement with SUA will continue into the future through other funded activities.

iAGRI Highlights from 2017

Building Capacity for Technological Innovation

The Sokoine University of Agriculture (SUA) offered a second tractor training workshop in February 2017, which attracted more than 400 applicants. Two banks (NMB and CRDB), an equipment lease-loan company (EFTA), and John Deere provided workshop participants with information on the financing services they provide for tractor owners. Some of the participants immediately applied for loans for purchase of tractors. The Eastern Africa Grain Council (EAGC) provided information on grain marketing services for farmers.



SUA staff attending an agricultural stakeholder's fair planned and implemented by SUA in early 2017.

Investment in Agriculture and Nutrition

iAGRI generated investments in agriculture and nutrition through the nurturing of linkages with the private sector, through organizational experiments, and through study tours that resulted in the acquisition of human capital in the form of knowledge and ideas. In 2017, the program has achieved 7370 dollars from new private sector capital investment in the agriculture sector or food chain leveraged by Feed the Future implementation.



The 2017 SUA stakeholder fair

Institutional Capacity Building

Evidence of the transformative impact of iAGRI: SUA staff attending an agricultural stakeholder's fair planned and implemented by SUA in early 2017. It was an outcome of a stakeholder listening process initiated with iAGRI's assistance as part of the College of Agriculture's development of a new strategic plan in 2016.

The 2017 SUA stakeholder fair attracted more than 200 persons from private companies, NGOs, government agencies, and the University. During the fair, SUA and stakeholders agreed upon several new public-private partnerships for training, applied research, and outreach. Based on its success, SUA is planning a follow up fair for 2018.

Strengthening Capacity to Provide Commercial Soil Laboratory Services

Tanzania lacks commercial soil laboratories capable of providing timely soil testing services for farmers and agribusinesses. Existing labs primarily serve researchers and are plagued by inefficiencies that lead to long delays in obtaining results. To solve this problem, the program provided design and establishment of a client-oriented, commercial soil testing laboratory to generate fee income for services provided to farmers and agribusinesses. In February 2017, The lab began processing soil samples through the new lab facilities.

iAGRI Highlights from 2017

Ohio State Leads Conference to Build Capacity Among Agricultural Higher Education Institutions in Africa

The Ohio State University-led Innovative Agricultural Research Initiative (iAGRI) in Tanzania recently completed a three-day workshop entitled “Capacity Building for Scientific Relevance in African Agricultural Universities” for 45 deans and faculty from 19 different agricultural universities in 11 different African countries.

Since food and agricultural systems in Africa are in transition, African agricultural universities need to transform their teaching, research, and outreach programs in order to better contribute to food security and national development. To improve the capacity of African universities to make these changes, the iAGRI project – administered through the Office of International Programs in Agriculture in the College of Food, Agricultural, and Environmental Sciences (CFAES) - designed and led a workshop from September 14-16, 2017 at Sokoine University of Agriculture (SUA) in Morogoro, Tanzania.



Dr. Frederick Kahimba (Left), Principal of SUA's College of Agriculture and Dr. Tag Demment, (Right), Vice President of International Programs at the Association of Public and Land-grant Universities (APLU)



Participating Deans and faculty at the workshop at Sokoine University of Agriculture, Morogoro, Tanzania.

Leading the program for Ohio State were Mark Erbaugh, Director of International Programs in Agriculture and iAGRI Administrative Director, and David Kraybill, Professor in the Department of Agricultural, Environmental, and Development Economics (AEDE) and Director of iAGRI.

The workshop was supported by the Norman Borlaug Leadership Enhancement in Agriculture Program at the University of California – Davis, with collaborative inputs from the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). SUA's Vice Chancellor, Professor Raphael Chibunda, opened the workshop before participants proceeded to engage in discussions on human and institutional capacity development, leading organizational change, strategies for universities to better engage with local and national communities, and strategic planning - all with a focus on enhancing the relevancy of agricultural universities to national development.

Integrated Pest Management Innovation Lab

East African Vegetable Crops – Tanzania, Kenya, and Ethiopia

The East African Vegetable Crops Project is one of several Integrated Pest Management Innovation Lab (IPM-IL) projects funded by USAID. This project was initiated in 2016 by Ohio State and partners with Virginia Tech University, UC – Davis, and other higher education and research institutions in Tanzania, Kenya, and Ethiopia to develop and implement IPM technologies for tomato, onion, African eggplant, cabbage, chilies, and beans. This project builds the capacity of host country institutions to implement effective IPM research and locally adapted, gender-appropriate, technology transfer programs that lead to reduced losses attributed to pests. The result is reduced use of synthetic pesticides, improved productivity, and enhanced outcomes for growers in the region. The project also evaluates program impacts on pesticide use, environmental benefits, farm productivity, and incomes, and uses this information to inform regional and national policy.

2017 Programmatic Highlights

Short term training – workshops & field days

A workshop in 2017 focused on Seedling Health for growers, extension personnel, and students, which taught using materials and hands-on techniques to produce disease- and insect-free vegetable seedlings as first step in IPM.

Long term training – graduate education

Hellen Elias Kanyagha is a Ph.D. student from Tanzania studying at Ohio State University in the Department of Plant Pathology under advisor Dr. Sally Miller. Hellen began her studies in March 2017 and will complete the program July 2019. Her thesis topic is “Characterization and Potential IPM Strategies in Managing *Ralstonia solanacearum* in Tomato”.

Denis Nyamu is from Kenya and is studying at Ohio State University. He started August 2017 on a M.S. degree in Entomology with his advisor Luis Cañas, and will finish his degree in July 2019. His thesis topic is “*Tuta absoluta* biology and management”.

Research on gender differences in IPM and vegetable farming

Dr. Cathy A. Rakowski, Associate Professor of Rural Sociology in the School of Environment and Natural Resources, conducted a thorough gender analysis of IPM issues and other aspects of vegetable farming in the three countries included in the project (Kenya, Ethiopia, Tanzania).

<https://u.osu.edu/cardina.2/progress-2017/>

Ohio State Team

John Cardina
Principal Investigator (PI)
Department of Horticulture
and Crop Science

Mark Erbaugh
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International Programs in
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Sally A. Miller
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Department of Plant
Pathology

Matthew Kleinhenz
Co-PI
Department of Horticulture
and Crop Science

Luis Cañas
Co-PI
Department of Entomology

Cathy Rakowski
Co-PI
School of Environment and
Natural Resources

In-country Collaborating Institutions

Kenya Agricultural and
Livestock Research Institute
(KALRO), Kenya

Sokoine University of
Agriculture (SUA), Tanzania

Mikocheni Agricultural
Research Institute (MARI),
Tanzania

Hawassa University, Ethiopia



Eston Mbuba shows off his tomato crop where healthy seedlings and IPM methods have allowed him to use no pesticides. He will market these through the Nthambo farmer group.

Kenyan Farmer Captures Market for Healthy Vegetable Seedlings

After graduation from Jomo Kenyatta University, Eston Mbuba got a job in Kenya's crowded capital city of Nairobi. He soon found his housing, food, transportation, and other living expenses too high, and his income too low, with little hope this would change anytime soon. His only option, it seemed, was to return to the land he had inherited from his father. Although Eston had little or no training in agriculture, he started organizing his farm and sought out a market niche where he could turn his math skills into business skills.

When Dr. Jesca Mbaka and colleagues from the Kenya Agricultural and Livestock Research Organization (KALRO) started doing work in his area, they needed farmers to be leaders. The other farmers in the area pointed to Eston – he was young, energetic, and seemed to have a good mind for business. Dr. Mbaka convinced him to attend a workshop on Seedling Health, in March, 2017, at Sokoine University in Tanzania. This initiated Eston's relationship with the East Africa Vegetable Crop Integrated Pest Management Innovation Lab (IPM-IL) project, sponsored by the U.S. Agency for International Development (USAID) and directed by scientists at KALRO and Ohio State.

Like most Kenyan farmers, Eston had thought that seedlings were all the same: if they looked bad when transplanted they would eventually get better in the field as long as you applied enough pesticide. At the workshop he learned how everything from seed to soil to watering practices at the seedling stage could affect

disease and insect susceptibility later on. After attending the IPM-IL workshop, Eston decided to specialize in the production of healthy seedlings. He has adopted several IPM technologies that he learned from KALRO and Ohio State scientists: he uses solarization to sterilize soil that is used in combination with potting media containing peat moss and cocoa-peat. He uses netting to exclude pests like Tuta absoluta and whiteflies from tomato seedlings. He plants high quality seeds of brassica varieties that are resistant to black-rot, and tomato varieties resistant to bacterial wilt. He discards any seedlings that do not meet his high quality standards so that no weak seedlings are transplanted to the field. By using these fundamental IPM practices, Eston's customers have been able to cut back greatly on synthetic pesticide use, and some farmers have been able to totally eliminate the use of synthetic pesticides. This saves them money, which is why they come back to Eston for seedlings for the next crop cycle.

With the returns on his investment in IPM methods, Eston has been able to diversify his farm and make improvements to his house. His earnings have also helped him to finance a vehicle to transport his seedlings to buyers and his farm produce to the local market. There's a certain prestige, he says, in delivering his goods in a vehicle he drives himself rather than hiring someone else who might not take as good care as he does. And when he sees farmers coming back to purchase more of his seedlings, he feels a sense of satisfaction that he has done a good job.

IPM Practices for Healthy Crops and Healthy Families

Ms. Harriett Muthoni joined the Nthambo farmers group after farming on her own for at least 10 years. In her previous farming experience, she grew a mix of maize and vegetables for market and to feed her family. Farming is especially difficult in the warm and humid environment of Kenya's forested hill country, where plant insect pests, diseases, and weeds are unrelenting. And Harriett had a problem: when she would come in the house after treating her crops with pesticides to protect them from insects and disease, she would often start feeling sick, and coughing, and her skin felt irritated. Even her children were affected because they were exposed by being outside when she sprayed and they would walk in or around the field even during application. Like most farmers in this area, Harriett had no training in pest and disease identification, so she did not know whether the pesticides she was spraying were suitable for the particular problem in the field. And like most farmers, she relied only on synthetic pesticides to control pests and diseases. Not only did she think they were making her family sick, they were so expensive that she had little profit at the end of the season.



Harriett Muthoni prepares to harvest French beans from her farm where IPM practices have allowed her to eliminate the use of synthetic pesticides

Harriett had joined the Nthambo group when irrigation water became available. But it was only when the group was approached by scientists at the Kenya Agricultural and Livestock Research Organization (KALRO) that they decided to learn, grow, and market as a group. Researchers from KALRO, led by Dr. Jesca Mbaka, connected the Nthambo farmers to the East Africa Vegetable Crop Integrated Pest Management Innovation Lab (IPM-IL), sponsored by the U.S. Agency for International Development (USAID) and directed by scientists at KALRO and Ohio State University. In this project, Harriett and 29 other farmers – most of them women – took part in KALRO-led IPM training. They started with pest and disease identification, and then learned different ways to manage these problems, especially methods that did not involve the use of pesticides.

Harriett stated that the IPM training was “the first time I understood anything about differences between pests and how organisms in the soils were the cause of tomato wilt.” She quickly embraced IPM tactics, including the use of healthy tomato seedlings, resistant varieties, and Trichoderma for nematode control in French beans. She uses a trap for *Tuta absoluta* in her tomato field, and applies a neem-based product at the first sign of infestation. On a recent visit she showed off a tomato field and adjacent kale field. Neither had received any synthetic pesticides; the tomatoes were flowering and the kale had been harvested three times already. She said, “I used to apply a pesticide to kale and then come back a few days later and spray again, and then had to wait several days before I could sell the crop. But if I waited too long I had to go back in and spray again.” Now, she said, instead of spending time spraying, she spends time at the market because she can spray a biological product one day and market it two days later. In addition to saving “a lot of money” on pesticides, she feels better; she is healthy, and she doesn’t have to be afraid to feed her vegetables to her children.

USDA Borlaug International Agricultural Science and Technology Fellowship Program



Cristina Chinchilla Soto

Researcher at the Environmental Pollution Research Center (CICA), as well as lecturer at the School of Agronomy, University of Costa Rica (UCR). Dr. Soto's particularly interested in the soil-plant continuum and how the management of these components impact future climate change.

Advised by Dr. Rattan Lal in the School of Environment and Natural Resources, her research addressed how soil fertility management might affect soil organic carbon storage in the short term, and how soil carbon sequestration impacts soil health. Soil carbon is not only the key element to Costa Rica becoming carbon neutral country by 2021, its quantity and quality have a direct impact on improving crop productivity.



Somanagouda Patil

An agronomist based at Rabat working at the International Center for Agricultural Research in the Dry Areas (ICARDA), Morocco. At ICARDA, he is involved in projects like Collaborative Research Program (CRP)-Grain Legumes, CRP-Wheat, FAO-CA, ICARDA-CAAS, ICARDA-ICAR and Food Security in Arab countries. His research interests are crop diversification and conservation agriculture, carbon sequestration and climate change, integrated crop management, soil health management, evaluation of improved breeding lines and agronomic packages for legumes/cereals.

From April 3 – June 30, 2017, advised by Dr. Rattan Lal in the School of Environment and Natural Resources, Dr. Patil conducted research on how climate smart agriculture practices impact soil respiration components and soil carbon stability.



Myriam Lorena Izarra

Junior Assistant Researcher at the International Potato Center (CIP), Lima, Peru. Advised by Dr. Tea Meulia in the Department of Plant Pathology, her research and training focused on molecular biology/bioinformatics, particularly using whole genome sequencing technologies.

Before the program began, Dr. Meulia visited CIP to assess the Center's research programs and to solidify Myriam's research objectives. During her program at Ohio State, Myriam spent the month of May at the MCIC preparing the DNA and RNA libraries for deep sequencing, and becoming acquainted with some bioinformatics tools for the analysis until the libraries were ready and sent out for sequencing. She returned in August and September to finish the project, also attend the 2017 American Phytopathological Society annual meeting.

The Borlaug Fellowship Program honors Norman E. Borlaug, the American agronomist known as the “father of the Green Revolution”, and promotes food security and economic growth by providing training and research opportunities to fellows from developing and middle-income countries.



Kristine Pascual

Senior research specialist at the Philippine Rice Research Institute (PhilRice). Advised by Dr. Rattan Lal in the School of Environment and Natural Resources. Her project entitled "Climate Smart Agriculture: Effects of biochar application and wetting and drying technique on the soil air concentration of greenhouse gas emissions in rice."

In addition to attending 2017 World Food Prize in Des Moines, IA., Dr. Pascual also participated in the Farm Science Review.



Alimata Bandaogo

Research specialist at the Institute of Environment and Agronomic Research, Burkina Faso. Advised by Dr. Rafiq Islam at the South Centers, her project entitled "Improving efficiency and profitability of fertilizer use within the framework of integrated soil fertility management for smallholder farmers". In addition to attending 2017 World Food Prize and Farm Science Review, she was one of the outstanding researchers selected to present her research work at the J-1 International Exchange Research Exposition organized by the Office of Research and Office of International Affairs.



Thobela Nkukwana

Lecturer in poultry nutrition at the University of Pretoria, South Africa. While at Ohio State, Thobela worked with Dr. Michael Cressman and Dr. Michael Lilburn in the Department of Animal Sciences. Her project was entitled "Effect of multi-enzyme supplementation on nutrient digestibility, growth performance, intestinal morphology and carcass yield in broiler chicks fed higher sunflower meal levels in starter and grower/finisher diets".

During the program, Dr. Nkukwana also attended 2017 World Food Prize in Des Moines, IA, and also visited a fellow Borlaug Fellow studying poultry extension at Cornell University.

Borlaug Fellows at the 2017 Borlaug Dialogue



K. Pascual, A. Bandaogo, and T. Nkukwana all attended the 2017 Borlaug Symposium in Des Moines, Iowa from October 18-20, 2017, as a component of their USDA Borlaug Fellowships. Joined by other Borlaug Fellows from around the world, they gained a more comprehensive understanding of the challenges and solutions surrounding global food security. The title of the 2017 Borlaug Dialogue "The Road out of Poverty," captured the achievements of the 2017 World Food Prize laureate, which emphasize the agricultural sector as means to lift millions of people out of poverty.

Faculty International Research Highlights

Dr. Clay Sneller, Horticulture and Crop Science, in Kneya

Dr. Clay Sneller, Professor in the Department of Horticulture and Crop Science, is serving as a Senior Scientist/Lead Plant Breeder at the International Livestock Research Institute (ILRI) in Nairobi Kenya. He is co-leading a Bill & Melinda Gates Foundation project entitled the Integrated Genotyping Service and Support (IGSS) platform. This is a partnership between ILRI and Diversity Array Technologies from Australia. The mission of the IGSS is to bring high-throughput, affordable genotyping service to crop and animal breeders in Africa so they can benefit from the newest molecular plant breeding (MPB) technologies.

Dr. Sneller is advising approximately 35 MPB projects covering a diverse array of crops, including coffee, cacao, maize and rice. His role in the IGSS is to identify promising projects, help shape the projects, and design and execute training programs for the IGSS partners. These efforts engage breeders from private companies, national research programs, and the CGIAR centers. He is also positioning the IGSS in partner with the new Excellence in Breeding program

from the Bill & Melinda Gates Foundation. The ultimate goal of these efforts is to reduce the costs and increase the efficiency of developing improved genetics to meet the broader food security, nutrition, and economic needs of Africa.



At National Coffee Research Institute (NaCORI), near Mukono, Uganda., looking at cacao

Dr. Thaddeus Ezeji, Animal Sciences, in Brazil

Dr. Thaddeus Ezeji, one of the recipients of the 2016 joint Ohio State and the São Paulo Research Foundation (FAPESP) mobility grants, is working on a project entitled “Energy-efficient production of butanol (an advanced biofuel) from eucalyptus wood” with his Brazilian collaborator, Dr. Adriano Pinto, Mariano of University of Campinas (UNICAMP), Campinas Brazil.

In the ongoing OSU-FAPESP funded project, Dr. Ezeji has been offering training in butanol fermentation and downstream processing in acetone-butanol-ethanol (ABE) fermentation to students and postdocs involved in the project, and helping with the

setup of the anaerobic cultivation chamber in the LOPCA- Bioen laboratory at FEQ/UNICAMP Brazil.

Dr. Ezeji and Dr. Mariano, have published partial project results in a manuscript entitled “Process design and economics of a flexible ethanol-butanol plant annexed to a eucalyptus kraft pulp mill”, in a peer reviewed journal of *Bioresource Technology*. They are working on another manuscript with final results obtained from the project.

Recognizing Dr. Ezeji’s collaborative efforts with his Brazilian collaborator, he was invited by the organizing committee of the Brazilian Bioenergy Science and Technology Conference

(BBEST 2017) to be a session speaker on “Production of bio-derived chemicals from lignocellulosic biomass: Challenges, mitigation strategies and select success stories” in Campos do Jordão, from October 17 - 19, 2017.

In addition, Dr. Ezeji met with Dr. Mariano and his Team on October 24, 2017, and also gave a lecture on “Butanol production from lignocellulosic biomass: Challenges and opportunities” to the School of Chemical Engineering, UNICAMP, Campinas, São Paulo, Brazil. A return visit by Dr. Mariano to Dr. Ezeji’s laboratory in Wooster has been scheduled on the 4th week of January (22-25), 2018.

Student Highlights in International Research

Taylor Klass

Undergraduate Student
Department of Animal Sciences

Taylor is one of the first students who will graduate in May 2018 with the CFAES Global Option designation on her diploma. In the Summer 2017, completed her undergraduate honors thesis research in Uganda studying smallholder, non-grazing dairy farms in the urban and suburban areas of the capital city, Kampala. Dr. Elly Subiiti from the Makerere University served as Taylor's mentor and Ugandan supervisor of her research.

The Global Option is a curriculum enhancement program through which Ohio State students may acquire a documented international expertise integrated into participating majors without adding time to graduation. It consists of education abroad, two on-campus courses with strong international focus, one capstone project, evaluation of global competencies on a standardized assessment, comprehensive e-portfolio of international activities and an optional world language other than English or native language.

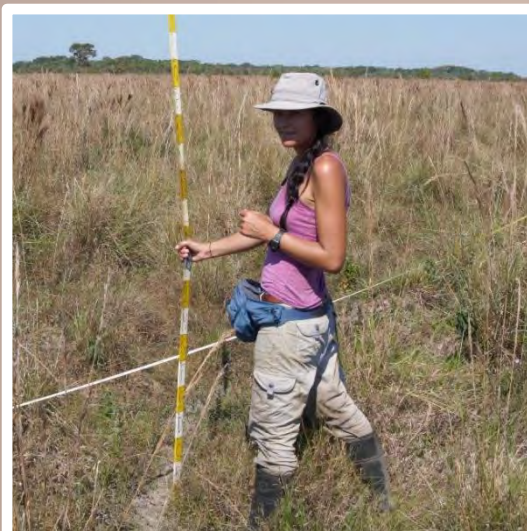
"Being invested in and wanting to better the world, and not just the United States, is so important to me," Taylor said. "I'm thankful the Global Option exists so I can show my commitment to and passion for international work."

Joanna Kingsbury

M.S. Student
School of Environment and Natural Resources

Joanna was funded by 2017 International Academic Enrichment grant to conduct research in Bolivia, entitled "Restoring Tropical Grasslands for Biodiversity in Beni, Bolivia".

The project focused on studying the effects of cattle ranching, agricultural burning and flooding on habitat structure and bird communities within one of the worlds most threatened and understudied savanna ecosystems. She travelled to Bolivia for two months between July and August 2017, and worked with her undergraduate research assistant Johnathan King. The results are expected to inform more sustainable approaches to land management in the Beni Region and develop ecological theory on the nature, interactions and effects of environmental disturbance on wildlife communities in wider grassland ecosystems.



Vivian Bernau

PhD Candidate

Department of Horticulture and Crop Science

Since February, 2017, Vivian Bernau has conducted research in Mexico with collaborator Dr. Denise Costich at the International Center for Maize and Wheat Improvement (CIMMYT). Her research, entitled "Germination of highland maize landraces under drought stress: in vitro and en campo", is funded by a Borlaug Graduate Research Fellowship from Purdue University's Center for Global Food Security.

The study explores local adaptation to drought in native crops. In Mexico she is investigating germination and emergence of traditional maize varieties from highland areas. This project has the potential to impact breeding strategies for drought tolerance and will provide a broader understanding of how maize germination and emergence varies across its native range.



Irene S. Kargbo

PhD Student

Department of Entomology

Irene is from Monrovia, Liberia and funded by Borlaug Higher Education for Agricultural Research and Development (BHEARD) program. From June - August 2017, she returned to her home country to collect species of rice stem borers for further research, entitled "Identification of rice stem borers and evaluation of the efficacy of *Metarhizium anisopliae* for their management in Liberia". Managing stem borers' damage will help to increase rice production with stable yields, which can make food available and increase the farmers' income. The research will bridge the knowledge gap on existing stem borer species composition in rice fields so proper management strategies can be developed using fungal pesticides as an alternative to chemical insecticides.

Steven Doyle

M.S. student

School of Environment and Natural Resources

Steven Doyle conducted field research on the interaction between agricultural practices, cropping systems, and soil quality in Morogoro, Tanzania, for 2 months in the summer of 2017. The research was a collaboration with the Sokoine University of Agriculture (SUA), and supported by the Office of International Programs in Agriculture in the College of Food, Agricultural, and Environmental Science (CFAES).

In Steven's study, the results provided insight on cropping systems utilized by the farmers of Morogoro, and concluded that their agricultural practices have significantly diverse effects on the land. Moreover, Ohio State-CFAES benefited from the collaboration and experienced broader and continued international exposure throughout Tanzania.



International Scholar Research Exposition



The 12th Annual International Scholar Research Exposition Opening Reception was held on November 17, 2017 outside President Michael V. Drake's office and Office of the Vice President of Research.

Current international J-1 visiting scholars at Ohio State were invited to submit research summaries and 37 finalists from 18 different countries were asked to create research posters for display in Bricker Hall through November and December 2017.

Eleven visiting scholars within CFAES were selected as finalists and invited to present their research findings to the Ohio State community.

CFAES Participants



Alimata Bandaogo, Burkina Faso
Maximize continuous no-till sustainability with cover crop blends and zeolite
Ohio State South Centers, advised by Dr. Rafiq Islam



Amanda Lima Vilela, Brazil
Seed quality parameters in different Phlox species
Department of Horticulture and Crop Science, advised by Dr. Pablo Jourdan



Carlos Saint-Preux, Haiti
Evaluation of fungicides for the control of Septoria leaf spot in tomato
Department of Plant Pathology, advised by Dr. Sally A. Miller



Emmanuel Amoakwah, Ghana
Soil water retention, air flow and pore structure characteristics after corn cob biochar application to a tropical sandy loam
Ohio State South Centers, advised by Dr. Rafiq Islam



Hardy Castada, Philippines
Detection of coffee adulteration through the analysis of volatile compounds during and after roasting using Selected Ion Flow Tube-Mass Spectrometry
Department of Food Science and Technology, advised by Dr. Sheryl Barringer



Jingtao Yao, China
Land-use optimization to improve the carbon holding capacity of soil in Beijing, China
School of Environment and Natural Resources, advised by Dr. Rattan Lal



Palvi Malik, India
Genome-wide selection for rapid introgression of productivity traits from *O. rufipogon* into *O. sativa*
Department of Horticulture and Crop Science, advised by Dr. Clay Sneller



Patricia Alves De Castro Silva, Brazil
Functional characterization of the bZIP ZipD transcription factor from *Aspergillus fumigatus*
Department of Plant Pathology, advised by Dr. Thomas K. Mitchell



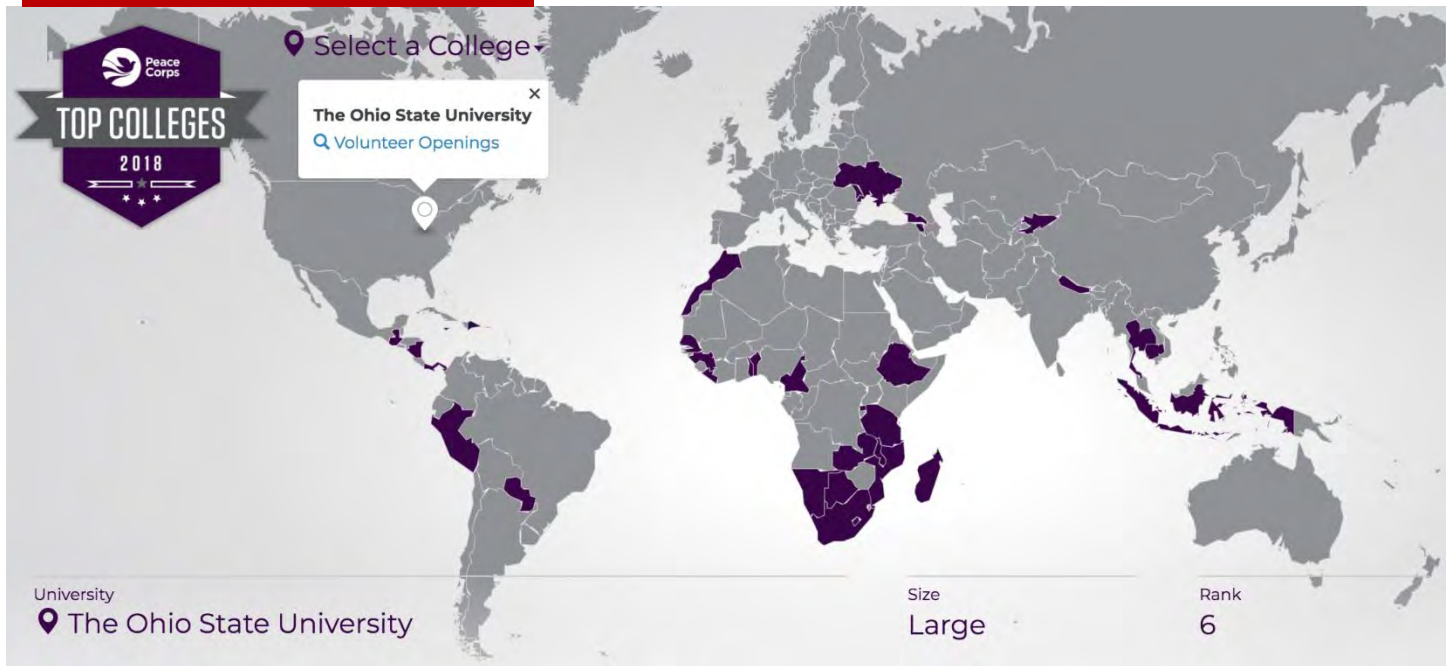
Tarik Mitran, India
Spatial prediction of soil carbon using satellite based indices and geo-statistical modeling approaches
School of Environment and Natural Resources, advised by Dr. Rattan Lal



Vinayak Shedekar, India
Evaluation of a novel resource-saving cultivation system for corn and soybean production
Ohio State South Centers, advised by Dr. Rafiq Islam



Yilmaz Bayhan, Turkey
Long-term continuous no-till and multi-functional cover crop systems to maximize agroecosystem services in Turkey
Ohio State South Centers, advised by Dr. Rafiq Islam



Peace Corps

The Peace Corps has announced that Ohio State ranked No. 6 among large schools on the agency's 2018 Top Volunteer-Producing Colleges and Universities list. There are 62 Buckeyes currently volunteering worldwide. Since the agency's founding in 1961, 1,821 Buckeyes have served in communities around the world.

This is the third year that Ohio State has ranked among the top 10 large schools. During the last three years, Ohio State has been climbing in the ranks, appearing at No. 10 in 2016 and No. 9 in 2017.

The Peace Corps, established in 1961 by the U.S. government, sends Americans abroad to tackle the most pressing needs of people around the world. Peace Corps Volunteers (PCV) work at the grassroots level toward sustainable change in agriculture, education, public health, community development, and a multitude of other areas.

The Office of International Programs in Agriculture has administered Peace Corps recruitment on Ohio State campus since 1974.

Gail Messick, who currently serves at the Peace Corps recruiter for the Ohio State campus, is a returned Peace Corp Volunteer (PVC) who served in St. Lucia from 1976-1978 and in Swaziland from 2010-2014, where she worked as a public health dental hygienist and promoted dental health in schools and in the surrounding community.



Upper:
Recent alumni
Nicholas Weinland,
Thomas Cummings,
Kim Schmahl, and
Amy Weinland are
serving in Liberia

Lower:
Recent alumnus
Mark J Koenig is
serving in Tanzania



Ohio International Internship Program

The Ohio International Internship Program, which is a functional unit within the Office of International Programs in Agriculture, specializes in providing international internships in the fields of agriculture, horticulture, turfgrass, and agricultural business.

In 2017, the program hosted 293 interns and 119 trainees from 40 countries. Throughout its 38 years in the college, the Ohio International Internship Program has hosted over 10,000 participants for training and currently has verbal agreements with 40 universities and organizations worldwide.

The internship program specializes in providing international students both practical learning and culture exchange opportunities through their internship / training in Ohio and other areas of the United States. Business owners and managers work with program staff in the Office of International Programs in Agriculture to accommodate international students studying agriculture so that they can obtain invaluable professional experience from leaders in the industry. Businesses also appreciate the opportunity to work with international students, allowing them to better understand how their industry performs in other countries and expanding their professional networks around the world.

More: www.ohioprogram.org



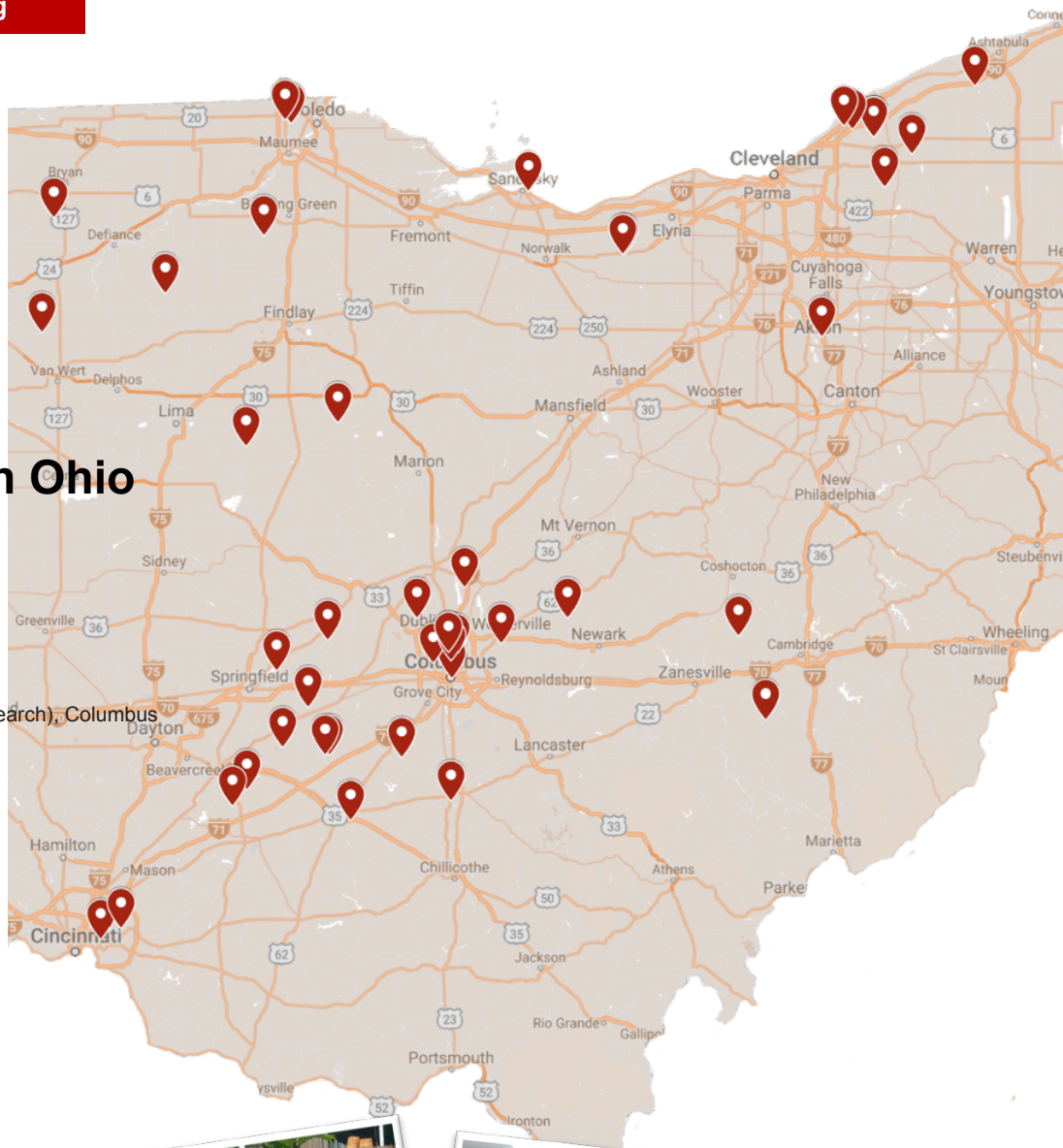
Attending World Dairy Expo

The Ohio Program (TOP) led 20 dairy interns/trainees to World Dairy Expo (WDE), held in Madison, WI from Oct 3–6, 2017. The WDE had 68,710 attendances and 884 companies from 28 countries. TOP interns/trainees attended five seminars and three lectures. They visited exhibitors and various cattle shows. Twenty interns/trainees also were invited to international business banquets. This education and social program provide TOP students a great learning and cultural exchange experience. The TOP program was also mentioned in a local newspaper story entitled, “International Experience Abound at Expo”.

Ohio International Internship Program

Industry Partners in Ohio

3 Flags Dairy LLC, Forest
AgriNomix, Oberlin
August Corso Sons, Inc., Sandusky
Benjamin Steel Co., Inc., Springfield
Chalet Debonne Vineyards, Austinburg
Columbus Crew SC, Columbus
Dept of Horticulture & Crop Science (Turf Research), Columbus
Double Eagle Club, Galena
Dummen NA, Inc., Columbus
Exscape Designs LLC, Chardon
Firestone Country Club, Akron
Gill Dairy LLC, South Solon
Green Circle Growers, Oberlin
Green Top acres LLC, Haviland
Groco Family Farms, Jamestown
Holden Arboretum, Kirtland
Holland Pyke LLC, Washington CH
Hyde Park Golf & Country Club, Cincinnati
Inverness Club, Toledo
KD Guest Ranch, Adamsville
Kinetico Incorporated, Newbury
Manders Custom Farming LLC, Weston
Michel Grand, Irwin
Miedema Dairy LLC, Circleville
Mozart's Inc, Columbus
Muirfield Village Golf Course, Dublin
Oakland Nursery, Columbus
Pro Milk Dairy LLC, Mt. Sterling
Rogers Krajnak - Architects, Inc., Columbus
Scioto Country Club, Columbus
The Camargo Club, Cincinnati
The Holden Arboretum, Kirtland
The Kirtland Country Club, Willoughby
The Wilds, Cumberland
Timbuk Farms, Granville
Toledo Botanical Garden, Toledo
Tom Hamilton Farm, Wilmington
Twin Oak Dairy LLC, South Solon
Van der Made Dairy, Sherwood
Van Deurzen Dairy LLC, Alger
Van Raay Dairy, South Charleston
WEISS North America, Inc., Willoughby
Wezbra Dairy LLC, Continental
Whitebarn Organics, New Albany
Wolfden Products Inc. DBA Wolf Composite Solution, Columbus
YNOT LLC, Cedarville





USDA Faculty Exchange Program

Through a collaboration between the Office of International Programs in Agriculture and the Department of Agricultural, Environmental, and Development Economics (AEDE), Ohio State University hosted from July – December 2017 six professors from Ukraine through the Faculty Exchange Program (FEP), a program sponsored by the U.S. Department of Agriculture's Foreign Agricultural Service (FAS). Ohio State has participated in the program intermittently since the early 2000's by training agricultural economics instructors from Eastern Europe to improve their practical understanding of curriculum development, teaching methodologies, and agricultural technical knowledge.

Dr. Allan E. Lines, Professor Emeritus in AEDE, and Dr. Stanley R. Thompson, Professor in AEDE, served as the faculty coordinators for the FEP program and arranged visits to industry sites, extension offices, and commodity organizations; arranged in-class observation sessions; and instructed on other topics such as agricultural credit systems, small farm management, and agricultural knowledge transfer. The fellows were also hosted by farm families in Ohio and stayed with them one weekend during the program.

2017 FEP Participants

- **Iryna Volovyk**
Dnipropetrovsk State Agrarian and Economic University
- **Oleksandr Olshanskiy**
Kharkiv State University of Food Technology and Trade
- **Oleksandr Opalov**
Zhytomyr National Agro-ecological University
- **Inna Lozynska**
Sumy National Agrarian University
- **Lesia Zaburanna**
National University of Life and Environmental Sciences of Ukraine
- **Viktoriia Krykunova**
Kherson State Agrarian University

USDA Scientific Cooperative Exchange Program

From July 24 - August 5, 2017, The College of Food, Agricultural, and Environmental Sciences, through a collaboration between the Office of International Programs in Agriculture (IPA) and Ohio State South Centers, hosted six visiting officials from China's Ministry of Agriculture (MOA) and Chinese Academy of Agricultural Sciences through the U.S. – China Scientific Cooperative Exchange Program (SCEP). The SCEP program is supported by the U.S. Department of Agriculture's (USDA) Foreign Agricultural Service and seeks to promote U.S. agricultural priorities, encourage long-term cooperation in agricultural science and technology, create a positive atmosphere for agricultural trade, and enhance overall relations between the United States and China. The 2017 SCEP Program focused on crop rotation and soil quality monitoring and detection in the U.S. Participants began their program in Washington, D.C. before traveling to Ohio to receive further training from CFAES faculty and specialists.

Dr. Rafiq Islam, Program Director of Soil, Crop and Water Resources at Ohio State South Centers and Beau Ingle, Program Manager in IPA, provided subject matter instruction as well as coordinated meetings and visits with stakeholders across Ohio.

Program site visits included:

- USDA National Headquarters
- USDA-ARS Headquarters and Research Station
- Ohio Department of Agriculture
- Ohio State South Centers
- Pickaway County Extension Office
- Pickaway County Soil and Water Conservation District
- Brandt Family Farm in Carroll, Ohio
- Lemaster Farm

Topics of most interest to the SCEP participants included federal/state budget authority and criteria, land-grant university system, Ohio State Extension services, nationally and internationally collaborative applied research and extension programs of soil and crop management, and local sustainable agricultural practices such as no-till, crop rotation, cover crop blends, soil health and field test, compaction and drainage. As a result of this program, all participants developed a fuller understanding of how the United States delivers the exchange of evidence-based knowledge and tools between agricultural producers and other agricultural and natural resources stakeholders as it pertains to crop rotation



The SCEP participants visited David Brandt Farm to learn about cover crop blends, soil health, and no-till



The U.S. Borlaug Summer Institute on Global Food Security is an annual 2-week long (June 4 – June 17) learning program at Purdue University for graduate students attending U.S. institutions interested in developing a holistic understanding of the conceptual challenges around global food security. Fally Masambuka-Kanchewa, a Ph.D. student in the Department of Agricultural Communication, Education, and Leadership, was selected to participate in the 2017 Summer Institute.

"It has energized me to conduct more research, especially in development communication, and how it contributes towards agricultural development."



Fulbright Fellowships

The Fulbright Program is the flagship international educational exchange program sponsored by the U.S. government and is designed to increase mutual understanding between the people of the United States and the people of other countries. In 2017, seven CFAES faculty either hosted Fulbright Scholars or were awarded Fulbright Awards.

The Visiting Fulbright Scholar Program 2017-2018

- Mousa Mohammad H Alreshidi, University of Hail, Saudi Arabia
Department of Food Science and Technology
- Boris Boincean, Selectia Research Institute of Field Crops, Moldova, worked with Rattan Lal in the School of Environment and Natural Resources.
- Botir Khaitov, Tashkent State Agrarian University, Uzbekistan, worked with Rafiq Islam at Ohio State South Centers

The Fulbright International Fellow/Student Program 2016-2017

- Andres Sanabria, Paraguay, worked with Sally Miller in the Department of Plant Pathology
- Fides Angeli Zaulda, Philippines, worked with Feng Qu in the Department of Plant Pathology

The Fulbright U.S. Scholar Program 2016-2017

- Joseph Campbell, Tanzania
School of Environment and Natural Resources
- Stanley Thompson, Czech Republic
Department of Agricultural, Environmental, and Development Economics



YALI – Mandela Washington Fellowship Program

The Mandela Washington Fellowship, the flagship program of President Obama's Young African Leaders Initiative (YALI), empowers young African leaders through academic coursework, leadership training, mentoring, networking, professional opportunities, and support for activities in their communities. The program is funded by the U.S. Department of State and is supported in its implementation by IREX, an international nonprofit organization focused on improving the quality of education, strengthening independent media, and fostering pluralistic civil society development.

Ohio State was selected as a sub-awardee in 2017, and through the collaborative leadership of the Center for African Studies and the John Glenn College of Public Affairs, hosted 25 fellows from 17 countries in Sub-Saharan Africa. Several of the fellows had academic and professional interests in agriculture and natural resources management, and were mentored by CFAES faculty/staff with compatible expertise:

- Dr. Rafiq Islam, Program Leader, Ohio State South Centers mentored Mavis Akom, Uganda;
- Dr. Stephen Boyles, Professor, Department of Animal Sciences mentored Mayoba Moono, Zambia;
- Dr. Mark Erbaugh, Director, International Programs in Agriculture mentored Christopher Eche, Nigeria;
- Dr. Cathy Rakowski, Associate Professor, Rural Sociology mentored Bashir Haiban, Somalia.

<https://cas.osu.edu/mandela-washington-fellowship>



Ohio Youth Institute



The Ohio Youth Institute (OYI), a subsidiary of the Global Youth Institute, was held on April 17, 2017 at the Nationwide & Ohio Farm Bureau Center on the Ohio State campus. The annual program is funded by the College of Food, Agricultural, and Environmental Sciences (CFAES), the World Food Prize Foundation, and Farm Credit MidAmerica, and is collaboratively administered by Ohio State University Extension and the Office of International Programs in Agriculture. 102 students from 11 high schools in Ohio participated in the one day event by presenting a research paper focused on a specific food security challenge facing a particular developing country.

The OYI engaged 28 academics, graduate students, professional staff from CFAES, Ohio State University and the food/agricultural industry as expert readers who evaluated oral presentations and provided valuable feedback to the students on their projects. In this event, students summarized their findings during small group discussions to their peers and experts. Following lunch, students listened to speakers and participated in experiential activities facilitated by Dr. Mary Kay Pohlschneider, Department of Food Science and Technology; Bob Horton, Ohio 4-H; and Shannon Hollis, OBIC. Student finalists were then interviewed for the opportunity to attend the Global Youth Institute in October.

Global Youth Institute

The Global Youth Institute (GYI) is held each year in Des Moines, Iowa during the annual International Borlaug Symposium, more popularly known as the World Food Prize. Ten Ohio high school students who had participated in the Ohio Youth Institute earlier in Spring 2017, along with five mentoring teachers, attended the GYI from October 18-21, 2017 to present their papers to peers, scientists, and other food security experts. In addition, they were able to interact with the 2017 World Food Prize Laureate, Dr. Akinwumi Adesina, President of the African Development Bank.



included Dr. Akinwumi Adesina, the 2017 WFP Laureate, as well as prior WFP laureates.

Education Abroad

The College of Food, Agricultural, and Environmental Sciences sponsored and delivered 16 study abroad programs in 18 different countries in 2017. Programs ranged from ten days to six weeks in length, and engaged faculty and staff from 7 units and departments within the College.

A total of 265 Ohio State students participated in CFAES-sponsored study abroad programs in 2017, with 195 of those students being from CFAES. 44 CFAES students studied abroad on programs not sponsored by CFAES. In sum, a total of 239 CFAES students studied abroad in 2017 (calendar year).

For more information on study abroad, contact Kelly Newlon at newlon.7@osu.edu.

More: <https://oia.osu.edu/education-abroad.html>

2017 Wolfe Education Abroad Scholarship Winners

Anna Garrett, and undergraduate student majoring in animal sciences, and Lauren Haney, and undergraduate student majoring in food, agricultural and biological engineering were two among 30 Wolfe Scholarship recipients throughout Ohio State. While Anna will use this scholarship to study in South Africa, Lauren will study in multiple countries in Europe.

2017 CFAES-sponsored Education Abroad Programs

Countries	Focus Area	Resident Director	Students	
			Total	CFAES
Australia	Human Impacts on the Natural Environment	Sue Rasche, Amanda McCann (SENR)	29	15
Brazil	Alpha Zeta Partners Program: Economics, Rural Sociology, Agricultural Development, History	Jeff King (ACEL)	16	15
Costa Rica	Service Learning: Ecosystems, Sustainability	Paul Heimberger (FAES)	13	10
Czech Republic	Czech Republic: Sustainability and Agricultural Policy in the EU	Gina Hnytka (AEDE)	12	6
Dominican Republic	Dominican Republic: Agricultural & Environmental Sustainability	Joseph Bonnell (SENR)	17	13
England, Scotland	England/Scotland: Agricultural and Environmental Communication	Emily Buck (ACEL)	11	10
England	England: Evolution in Darwin's World and Ours	Carol Anelli and Wendy Klooster (Entomology)	8	3
Ghana	Ghana: ATI Arts and Service Learning	D Elder, Nathan Crook (ATI)	6	6
Honduras	Honduras: Community Development & Education	Jamie Cano, Warren Agner (ACEL)	15	14
Iceland	Iceland: Environment and Natural Resources	Susie Burks, Brian Slater (SENR)	12	7
Netherlands, Germany, and Belgium	European Dairy Studies	Maurice Eastridge (Animal Sciences), Kathryn Proudfoot (Vet)	20	17
New Zealand	New Zealand: Sustainable Tourism & Human Impacts on the Environment	Robert Gates, Lumarie Perez-Guzman (SENR)	16	5
Nicaragua	Nicaragua: FAES First-year Student Experience	Jeff Hattey (FAES), Mary Rodriguez (ACEL)	25	24
Spain	Human and Animal Interactions	Kelly George, Steve Moeller (Animal Sciences), Ale Relling (OARDC)	31	25
South Africa	South Africa: Exotic Animal Behavior	Kelly George, Steve Moller (Animal Sciences)	18	14
Tanzania	Sustainable and Resilient Tanzanian Community	Joe Campbell (SENR), Mary McLaughlin (FAES)	16	11
18 Countries	16 Programs	28 Resident Directors	265	195

International Outreach and Engagement



Master Gardener Volunteer Service Visit to Ecuador

From February 3-10, 2017, twelve members of CFAES' Master Gardener Program visited Ecuador, where they used their gardening skills to lend a helping hand in rural communities. This "gardening volunteer vacation" was sponsored by Ohio State Extension Master Gardeners and organized by The Tandana Foundation. The master gardener volunteers (MGV) contributed to the foundation's diligent work over the last several years to develop relationships in this area and to work with the communities in creating projects that will help to improve the quality of local life.

During the visit the MGVs planted 200 ornamental plants at the meteorological center in Inguincho and spent several mornings working in the herb and vegetable garden with the nurses at the health center in Quichinche. The volunteers also helped local plant expert and long-time Tandana friend weed the fields in Panecillo. They also had the opportunity to visit the Polylepis Reserve and toured the forest and alpine tundra.

This trip was also filled with non-gardening related activities that enabled the volunteers to experience the local culture. The group visited the homes of Tandana friends to learn how to make bracelets and about the traditional dress. The volunteers also went to the living Kichwa Museum, where they learned about the language and culture of Ecuador's indigenous people. Everyone

enjoyed visiting the world famous Otavalo Market and a boat ride on Cuicocha Lake. The trip was capped off with a farewell dinner at the Cocina Kawsaymi Cooking School.

"If you want to better understand the world in which we live, then take part in this program," said volunteers Judy and Terry Fredrich of Springfield.

Ohio State Extension Master Gardeners provides intensive training in horticulture to interested Ohio residents who then volunteer their time assisting with educational programs and activities for Ohio residents through their local Ohio State Extension county office.



Dr. Robert Agunga, ACEL, in Pakistan

Dr. Robert Agunga, Associate Professor in the Department of Agricultural Communication, Education and Leadership (ACEL) was awarded a grant for \$455,239 from The National Academies of Sciences, Engineering and Medicine for an international development research project titled, "Improving Agricultural Extension in Pakistan through Communication for Development." The purpose is to pilot-test a communication strategy for improving aid effectiveness.

Dr. Agunga's award was one of 14 projects awarded grants under Phase 7 of the Pakistan – U.S. Science and Technology Cooperation Program and one of 220 proposals reviewed for funding in 2017.

This project, which seeks to improve agricultural extension in Pakistan through communication for development is in partnership with Pakistan partner, Dr. Badar Siddiqui, head of the Department of Agricultural Extension Education at the Pir Mehr Ali Shah (PMAS) Arid Agriculture University at Rawalpindi near Islamabad, Pakistan.

The project's aim is to find a strategy for improving the effectiveness of international development aid. Success will require the inclusion of communication strategists in development programming under the rubric of Communication for Development (C4D), an emerging science aimed at addressing human dimension elements in development, such as participation, integration and capacity building. This

new cadre of development professionals is currently non-existent in Pakistan.

Dr. Agunga and his Pakistani counterparts will design a social science-based, Master's degree program at the university level to improve development performance and strengthen agricultural extension in the field by promoting participatory development strategies align with C4D.



Harold Watters, Ohio State Extension, in Ukraine

Harold Watters, Ohio State Extension Field Specialist in Agronomic Systems, completed his ninth and tenth trips to Ukraine in April and October in 2017. He first traveled to Ukraine in 2012 after an invitation was extended by Cultivating New Frontiers in Agriculture (CNFA), an international non-profit organization working closely with farmers associations in Ukraine.

Dr. Watters then began to work with BRIDGES, which is a sustainable legacy organization that developed from 15-year presence in Ukraine of the Farmer-to-Farmer program that was funded by the US Agency for International Development (USAID). Currently, BRIDGES continues to serve Ukrainian agribusinesses and entrepreneurs in what is now its nine's year of fully independent operation.

The 2017 visits were to a mix of smaller farming operations of 1300 to 6000 hectares (3000 to 15000 acres). Dr. Watters visited about two dozen operations, mainly focused on precision agriculture tools and practices, nutrient management, tillage use, and



Discussing with local agronomist in Khmelnytskyi Oblast

marketing of products.

He then developed and presented a set of recommendations for each farm that largely focused on improving precision agricultural technologies, incorporating reduced tillage, managing nutrients, and scouting efforts to determine in-season crop needs.

Dr. Valente B. Alvarez , Food Innovation Center, in Nicaragua

In March 2017 Dr. Valente B. Alvarez, Professor and Director of the Food Industries Center, spent two weeks in Nicaragua delivering training on product handling and processing methods, to ultimately improve food safety and product quality in the country's dairy processing plants. Dairy plant visits were conducted at the following locations: Ganadería Cisne, Grupo Industrial del Norte S.A. GRINSA, Finca San Ramon, Cooperative Nicacentro, Gelateria Kiss Me, Cooperative San Felipe, Cooperative Masiguito, and Cooperative San Francisco de Asis. The dairies produce a variety of cheeses, milk, and ice cream.

A short HACCP Overview Course was provided to plant management, academia and consultant personnel to review the principles of this food safety system. Dr. Alvarez also attended a the "XV Congreso Nicaragense del Sector Lácteo 2017", focused on the use of probiotics in dairy products.

Dr. Alvarez also presented at the National Agrarian University entitled "Essential Milk properties and Good Manufacturing Practices", which included an overview

of the U.S. dairy industry.

Lastly, principles of the HACCP program and the importance of this food safety system were discussed on a radio talk show hosted by Nicaraguan Chamber of Plants.



Dr. Alvarez giving an interview on a national Radio Talk Show hosted by Nicaraguan Chamber of Plants.

Dustin Homan, 4-H Youth Development, in Nigeria

On May 16, 2017, Dustin Homan, Program Manager of Ohio 4-H Youth Development and Mandela Washington Fellowship Reciprocal Exchange Fellow, visited Nigeria to collaborate with a 2016 Mandela Washington Fellow, Cosmas Anweh. Their project focused on designing 4-H programming and launching 4-H clubs in Benue State, Nigeria.

Dustin received a warm welcome from students and staff of the pilot institutions creating 4-H programs: Mount Saint Gabriel School, Crystaland Schools and Seamus Hunter School. He presented the 4-H initiative through a range of interactive activities and games, to both students and adult volunteers who will go on to serve as club leaders. He shared his experience of the positive influence his club leader had in his personal and professional development.

Speaking at Radio Makurdi, Dustin described his childhood 4-H project and the values it taught him. He emphasized how not only being an active member in 4-H prevents students from engaging in social vices, it gives young people an opportunity to contribute to their country's development.



Dustin making a presentation to students at Mount Saint Gabriel School



Dr. Mark Erbaugh represented Dr. Modi to receive the award

International Awards and Recognitions

CFAES International Alumni Award



Dr. Albert Theminkosi Modi, Acting Deputy-Vice Chancellor and Head of the College of Agriculture Engineering & Science, University of KwaZulu-Natal (UKZN) in South Africa, was a 2017 recipient of the College of Food, Agricultural, and Environmental Sciences' International Alumni Award.

The CFAES Alumni Society sponsors an annual awards program to recognize individuals who have made significant contributions through their careers. He was nominated for the award by Dr. Mark Erbaugh, Director of International Programs in Agriculture.

Dr. Modi is a 1999 graduate of the Department of Horticulture and Crop Science (HCS). He was funded by a Fulbright Scholarship, and worked on soluble carbohydrates in soybean during seed development and germination. His principal research has been focused on

indigenous-traditional crops as they relate to science and technology, crop physiology, agronomy and sustainable agriculture.

"Ohio State is a great university. I am proud to say that, in me, it produced an academic to serve the University of KwaZulu-Natal, South Africa, Africa and the world," said Dr. Modi.

Dr. Modi returned to the UKZN in 1999 to continue his career as Crop Science lecturer in the School of Agricultural Sciences and Agribusiness. He was recognized for his significant contributions to food security in sub-Saharan Africa, particularly in South Africa. He served as founding Chief Executive Officer of the Moses Kotane Institute, and was chairperson of the South African Agriculture and Life Sciences Dean's Association (SAALSDA). He was also an associate editor of the South African Journal of Plant and Soil (SAJPS), and has served in various leadership roles in the South African Society of Crop Production (SASCP), including being President from 2007-2008.

Visiting International Delegations

Ministry of Agriculture, China



In August 2017, six delegates from the Chinese Ministry of Agriculture under the US-China Scientific and Cooperative Exchange Program (SCEP) visited to exchange knowledge on conservation agricultural practices. Dr. Rafiq Islam was the primary trainer and principal investigator of the Crop Rotation and Soil Quality Monitoring and Detection project. The SCEP delegation was led by Dr. Yuguo Liu, Deputy Director-General of the Chinese Ministry of Agriculture's Farmland Quality Monitoring and Protection Center.

The goal of the project was to expose senior officials from the Chinese Ministry of Agriculture to the layered cross-sectors of the U.S.' system for understanding, supporting and strengthening the widespread development and implementation of sustainable agricultural practices.

Syngenta Advisory Board, Brazil

In September 2017, CFAES welcomed 20 Brazilian entomologists from Syngenta. The visit, which was organized by Dr. Andy Michel, Associate Professor in the Department of Entomology, was key to deepening CFAES' expansive engagement in Brazil. The focus of the visit was to discuss potential collaborations in the area of agricultural teaching and research.

Included in the delegation were Maria Neder, Rector of Federal University of Mato Grosso; Paulo Teixeira de Sousa Jr., Head of International Relations Office in Federal University of Mato Grosso; Rogerio de Andrade Coimbra, Professor of Seed Technology; Daniel Carneiro de Abreu, Professor of Sustainable Agriculture.



Department of Rural Development & Agrarian Reform in Eastern Cape and African Footprints of Hope, South Africa



In November 2017, CFAES welcomed to Ohio State two partners from South Africa - Department of Rural Development & Agrarian Reform in Eastern Cape and African Footprints of Hope - to sign a memorandum of understanding (MOU) for long-term cooperation in agricultural research, rural outreach and sustaining life. The delegation has visited earlier in August to explore future collaboration.

The delegation was led by Hon. MEC Mr. Mlibo Qoboshiyana, Minister of Department of Rural Development & Agrarian.

International Agreements

International agreements are not only symbolic of scholarly cooperation, but also important tools for collaborating through teaching, research, and outreach with global partners. In 2017, CFAES experienced another productive year in developing and signing six new agreements with higher education and research institutions in four countries.

- Kyiv National Economic University named after Vadym Hetman, Ukraine (September 2017)
- Kharkiv Petro Vasylenko National Technical University of Agriculture, Ukraine (September 2017)
- Institute of Water Problems and Land Reclamation, Ukraine (October 2017)
- Department of Rural Development and Agrarian Reform, South Africa (November 2017)
- Egerton University, Kenya (December 2017)
- Central Queensland University, Australia (December 2017)

The signing of these six agreements brought the total number of active agreements between CFAES and international partners to 31. These active agreements represent formal relations existing between CFAES faculty and agricultural institutions of higher learning and research in 19 different countries.

As of the end of the 2017 calendar year, there are ten international agreements in the development or approval stages.

More: <http://cfaes.osu.edu/international/opportunities/international-agreements>

Record of Active International Agreements

Country	Institution	Type of Agreement	Year Initiated	Year of Expiration
Australia	Central Queensland University	Memorandum of Understanding	2017	2020
Brazil	Universidade Estadual Paulista	Memorandum of Understanding	2013	2018
Brazil	Universidade Federal do Paraná	Memorandum of Agreement	2014	2019
China	Chinese Academy of Agricultural Sciences	Memorandum of Agreement	2015	2020
China	China Agricultural University	Memorandum of Agreement	2015	2020
China	Huazhong Agricultural University	Memorandum of Understanding	2016	2021
China	Hubei Academy of Agricultural Sciences	Memorandum of Understanding	2014	2019
China	Fudan University	Letter of Intent	2015	2020
China	Jilin Agricultural University	Memorandum of Understanding	2014	2019
China	Shandong Academy of Agricultural Sciences	Memorandum of Understanding	2015	2020
Czech Republic	Brno University of Technology	Memorandum of Understanding	2017	2022
France	CIRAD/INRA/CGIAR/IRD	Memorandum of Understanding	2016	2021
Ghana	Evangelical Presbyterian University College	Memorandum of Understanding	2014	2019
Honduras	Escuela Agrícola Panamericana – “El Zamorano”	Memorandum of Understanding	2014	2019
India	Indian Council of Agricultural Research	Memorandum of Agreement	2014	2019
Kenya	Egerton University	Memorandum of Understanding	2017	2022
Macedonia	University of SS. Cyril and Methodius	Memorandum of Understanding	2013	2017
Pakistan	The University of Agriculture	Memorandum of Understanding	2013	2018
Romania	University of Agricultural Sciences & Veterinary Medicine, Cluj-Napoca	Memorandum of Understanding	2014	2019
Senegal	University of Gaston Berger	Memorandum of Agreement	2013	2018
South Africa	Department of Rural Development and Agrarian Reform	Memorandum of Understanding	2017	2022
Tanzania	University of Dodoma	Letter of Intent	2016	2019
Tunisia	National Institute of Agronomy of Tunisia	Memorandum of Understanding	2013	2018
Uganda	Makerere University	Memorandum of Understanding	2013	2018
Uganda	Makerere University	Memorandum of Agreement	2013	2018
Ukraine	Dnipropetrovsk State Agrarian and Economic University	Memorandum of Understanding	2015	2020
Ukraine	Institute of Water Problems and Land Reclamation	Memorandum of Understanding	2017	2022
Ukraine	Kyiv National Economic University named after Vadym Hetman	Memorandum of Understanding	2017	2022
Ukraine	Kharkiv Petro Vasylenko National Technical University of Agriculture	Memorandum of Understanding	2017	2022
Ukraine	Kharkiv State University of Food Technology and Trade	Memorandum of Understanding	2017	2022
Uzbekistan	Tashkent State Agrarian University	Memorandum of Understanding	2017	2022

Transforming Tanzanian Agriculture

CFAES Faculty Train Extension Instructors on Agribusiness and Entrepreneurship



Food security, poverty alleviation, low agricultural productivity, and youth underemployment in Tanzania can be addressed by encouraging its farmers to become more business and market oriented.

Although the agricultural sector is Tanzania's most important sector – 77% of its population depends on agriculture as their main form of livelihood – the country's agricultural productivity growth is stagnant. This disconnect is of significant concern, considering that the nation's current population of 48 million is expected to double by 2050 and 65% of the population is under the age of 35.

"A key to promoting agricultural growth is to transform Tanzanian agriculture from semi-subsistence to a more market-oriented agriculture by linking producers to improved technologies and markets, including value-added links to processors and other higher end market opportunities," says Mark Erbaugh, Director of the Office of International Programs in Agriculture and Principal Investigator of the project entitled "Improving Rural Outreach Capacity in Tanzania: A Pilot Curriculum Reform Initiative to Increase Relevance of Trainer Training".

This notion was recently echoed by Geoffrey Kirenga, Chief Executive Officer of Southern Agricultural Growth

Corridor of Tanzania (SACGOT), a multi-stakeholder partnership aimed at rapidly developing the agricultural potential of Tanzania's southern region.

"The emphasis needs to be on increasing smallholder agricultural output and changing Tanzania's smallholder agriculture from subsistence to commercial farming," stated Kirenga during his recent testimony to Tanzania's Parliamentary Committee on Agriculture, Livestock and Water (Tanzania Daily News, 2017, p. 2).

To contribute to this transformation, agricultural extension workers working on the frontlines must to be able to advise farmers not only on technical production, but also on how they can manage their farms as a business to be more efficient and profitable.

This was the focus of a three day workshop delivered at Sokoine University of Agriculture (SUA) in Tanzania to instructors of extension agents from Tanzania Ministry of Agriculture Technical Institutes (MATIs) and Livestock Training Institutes (LITAs), by Erbaugh, Dave Hahn, Professor Emeritus in the Department of Agricultural, Environmental, and Development Economics (AEDE), and Barry Ward, Assistant Professor and the Leader of Production Business Management in Ohio State University Extension.

The workshop, entitled “Farming as a Business” was designed to enhance the instructional capacity of MATI/LITA instructors by providing course content on agricultural value chains, agribusiness and farm management, and entrepreneurship.

These three areas were earlier identified as priority areas in which extension agents require enhanced training by farmers, agribusiness employers, and Ministry of Agriculture, Livestock, and Fisheries (MALF) officials during a 2016 skills-gap assessment of frontline extension workers (FEWs).

Specific topics covered in the workshop included farm record keeping, balance sheets, partial budgeting, business and market plan development, an overview of agricultural value chains in Tanzania provided by Mr. Allen Mhidze from the Small Industries Development Organization (SIDO), and entrepreneurship that highlighted linkages with the value chain.

Since the training of FEWs occurs at Ministry of Agriculture Training Institutes (MATI) and Livestock Training Institutes (LITAs), the workshop specifically targeted instructors at these institutions by using a

training-of-trainers approach to enhance their instructional capacity on these important topics. Attending the workshop were 22 of these instructors from five MATIs, two LITAs, and the Sokoine University Graduate Entrepreneurs Cooperative (SUGECO). Also in attendance were lecturers from SUA’s Department of Agricultural Extension and Community Development (DAECD). One of the workshop participants stated that the workshop was quite valuable for MATI instructors and she wished this type of training could be brought to extension workers in the field.

The workshop was organized in collaboration with Dr. Jeremia Makindara (Ohio State, '06, MS, Agricultural Economics), Head of Department of Business Management in SUA’s School of Agricultural Economics and Business Studies.

The effort was an outgrowth of the USAID-supported Innovative Agricultural Research Initiative (iAGRI) administered by Ohio State through the International Programs in Agriculture Office, and received additional support through a 2016 Impact Grant from Ohio State’s Office of Outreach and Engagement.



Coffee Fields in East Africa



Group photo at 2017 World Food Prize: (from left to right) Alimata Bandaogo, Kristine Pascual, Beau Ingle, Rafiq Islam, Thobela Nkukwana, and Emmanuel Amoakwah.

CFAES Impacts Global Food Security through Borlaug Program

Collaborative Stories of CFAES Faculty and Borlaug Fellows

In Autumn 2017, the College of Food, Agricultural, and Environmental Sciences (CFAES) was selected to host Alimata Bandaogo from Burkina Faso, Kristine Pascual from the Philippines, and Thobela Nkukwana from South Africa to work with CFAES faculty members through the support of the Borlaug International Agricultural Science and Technology Fellowship Program. The Borlaug Fellowship Program is supported by the Foreign Agriculture Service in the United States Department of Agriculture (USDA), and aims to promote food security and economic growth by providing training and collaborative research opportunities to fellows from developing and middle-income countries. By improving fellows' understanding of agricultural science, the program helps foster science-based trade policies that improve international market access for U.S. agricultural products.

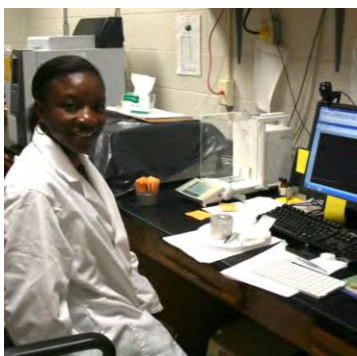
The program's namesake, Norman E. Borlaug, was an American agronomist, humanitarian and Nobel laureate known as the "father of the Green Revolution." Through the Borlaug Fellowship Program, approximately 800 scientists, researchers, or policymakers from 64 countries have participated in research and training since 2004. Each fellow works one-on-one with a mentor at a U.S. university, research center or government agency, usually for 8-12 weeks. The U.S. mentor later visits the fellow's home institution to continue cooperation, and to promote long-term food security and economic growth.

Assisting Burkina Faso's Smallholders in Better Fertilizer Use

In Burkina Faso, agriculture accounts for 37% of the gross domestic product, while 80% of the population is low-income subsistence farmers. These farmers grow accustomed to following blanket recommendations for applying fertilizer, without considering whether these recommendations are suitable for every farmland type.

To address this knowledge gap, Alimata Bandaogo, 2017 Borlaug Fellow and research specialist at Burkina Faso's Institute of Environment and Agronomic Research, is working with Dr. Rafiq Islam (Ohio State South Centers) on a project entitled "Improving efficiency and profitability of fertilizer use within the framework of integrated soil fertility management for smallholder farmers".

"My research is based on how to increase soil fertility with the use of leguminous crops (e.g. cowpea, soybean, mucuna) in rotation with cereal crops (e.g. maize, rice)," says Alimata, who is also studying fertilizer microdosing across various cropping systems.



For the fellowship period at Ohio State, Alimata laid out three objectives: 1) To familiarize herself with new techniques of soil sample analysis, 2) to understand long-term continuous no-till, and 3) to study greenhouse gas emissions in maize production systems. Her knowledge gained in these areas will not only aid Burkina Faso's farmers to use specific fertilizer in certain soil types, but increase the resilience of the country's agricultural production systems against climate change.

Alimata shares that CFAES staff and students are as nice as those in Burkina Faso, which has made her time at Ohio State enjoyable. "I want to especially thank my mentor, Dr. Islam, who has taught me so many different things."

For instance, Alimata describes how in Burkina Faso, scientists are familiar with some conventional field testing or sampling techniques, but are not aware of easier ways to do some of these things. She said that she is looking forward to continuing to work more on these experimental techniques after her return to West Africa.

More Rice with Less Greenhouse Gas Emissions

Kristine Pascual, 2017 Borlaug Fellow and senior research specialist at the Philippine Rice Research Institute (PhilRice), is working with Dr. Rattan Lal (School of Environment and Natural Resources) on a project entitled "Climate Smart Agriculture: Effects of biochar application and wetting and drying technique on the soil air concentration of greenhouse gas emissions in rice."

Water shortage and unequal distribution of irrigation water are not only challenge for Kristine's home country, the Philippines, but for Asia overall.

"It takes as much as 4000 liters of water to produce one kilogram of rice," explains Kristine.

To deal with this problem, scientists in the International Rice Research Institute and PhilRice have developed several water management strategies to save irrigation water while still maintaining good yields. Kristine has been involved in applied research on water management in rice production through alternate-wetting and drying (AWD) in the Philippines, which allows farmers to save irrigation water up to 35% without yield loss. She's also been engaged in several projects analyzing biochar use and water management in relation to greenhouse gas emissions, tillage, and crop establishment of rice.

Coming from a research institution that only focuses on the Philippines main staple, rice, Kristine says that it's a great honor to work with Dr. Rattan Lal - an excellent, obliging mentor, and one of the world's renowned soil scientists.

"It's an opportunity for a young and budding researcher like me to work with Dr. Lal to gain a broader perspective in soil science, even though my formal academic training is in agricultural engineering. I hope that even beyond my short stint at Ohio State, I will continue to collaborate with him in the future."

For Kristine, Ohio State was a very ideal place to gain practical experience and science-based knowledge to then apply in a developing country like the Philippines. "I hope to use the output of my research as supplementary data for my on-going research on biochar in the Philippines, and hope to publish my research with Dr. Lal".



A Partial Replacement in Poultry Diets for Small Scale Farmers



Maize and soybean meal are often the main ingredients in poultry diets, but when soybean prices are not favorable, it is necessary to consider a partial replacement in poultry feed. In South Africa, sunflower is the third largest grain crop produced after maize and wheat, and together with soybeans, canola, peanut, and cottonseed, constitute the four oilseeds produced.

Several medium-enterprise and small scale producers in South Africa, who consistently fight against high production costs, would benefit the most from substituting sunflower for soybean in poultry feed. The Agricultural Research Council (ARC), the only agricultural research organization in South Africa, has conducted research to assist emerging small scale farmers in addressing this and other production challenges. ARC is also where

Thobela Nkukwana, 2017 Borlaug Fellow and newly appointed lecturer in poultry nutrition at the University of Pretoria, South Africa, has worked with for almost three years.

Poultry scientists have become few and far between in Thobela's country. She sees the Borlaug Fellowship as not only a personal professional development opportunity, but a means for building South Africa's network for future collaboration in poultry science, and a mechanism for enhancing South Africa's economy and food security.

"Poverty has a huge effect on economic and social stability," says Thobela. "The Borlaug Fellowship appealed to me as a way to change the mindset of how we use agriculture and farming to improve the living standards and combat hunger in developing countries, especially in Africa," shares Thobela. She says it provided a chance for her to practice how to transfer knowledge for practical adoption and the use of existing technologies.

While at Ohio State, Thobela is working with Dr. Michael Cressman and Dr. Michael Lilburn (Department of Animal Sciences) on a project entitled "Effect of multi-enzyme supplementation on nutrient digestibility, growth performance, intestinal morphology and carcass yield in broiler chicks fed higher sunflower meal levels in starter and grower/finisher diets".

"Dr. Lilburn has practical extension experience in poultry production, and has historically provided technical advice to one of the two biggest broiler producers in South Africa. He also excels at relating theory and published findings to practical situations," explains Thobela.

She says that Ohio State has provided her with a conducive working environment, and that when she visited main campus and met with Dr. Cressman, she appreciated practical exposure to undergraduate students, and to real industry practices."

Since agricultural extension services in Thobela's country are often neglected, Ohio State as a land grant university, provided an excellent model for Thobela to learn about more novel strategies and investigative approaches for improving extension. Thobela is eager to continue her collaborations with Ohio State, saying "The need for future research collaborations between South Africa and the U.S. is paramount."