



International Programs in Agriculture

Message from the Director

Purdue University College of Agriculture (CoA) relies on collaboration and partnerships. That is true in international programs, as well as in domestic research, education, and engagement. We realize that we cannot do everything ourselves. This issue of *Highlights* illustrates many of those partnerships, and I hope it will motivate some new collaborations.

The first level of collaboration is within the college. Faculty, students, and staff work together to bridge international culture and communication gaps. For example, Mark Russell from the Department of Animal Sciences organizes a service-learning course that takes students from several departments to Haiti. Another example is the Purdue Improved Crop Storage (PICS) project, currently under the leadership of Dieudonné Baributsa from the Department of Entomology. Over time, PICS has engaged faculty and students from five departments with the goal of improving grain storage in Africa.

Another level of collaboration is with other universities around the world. Some of those linkages started many years ago. For example, the relationship between Purdue and the Federal University of Vicosa (UFV) in Brazil started in 1952. Others, like

the student exchanges with the University of São Paulo, Pirassununga, Brazil and the National Taiwan University in Taiwan, started in the last few years.

At Purdue we depend on donors and philanthropy to help provide the resources for our international engagement, education, and research. CoA study abroad is enhanced by gifts, which help make international study affordable. On the research and engagement side, we partner with the Bill & Melinda Gates Foundation, the U.S. Agency for International Development (USAID) and many other agencies, foundations, and organizations.

The *2012–2013 Highlights* is a brief summary of international programs in agriculture activity over the past year. If you are a member of the Purdue community, a longtime collaborator, or a new partner, we hope that next year your collaboration will be outlined in the *Highlights*. Please contact us or someone in a CoA department if you have any questions or comments about CoA international activities.

Jess Lowenberg-DeBoer
Associate Dean and Director of
International Programs in Agriculture

STAFF NEWS

Jess Lowenberg-DeBoer and Larry Murdock (Entomology) were made “Chevalier de l’Ordre National du Burkina Faso” in Ouagadougou on October 13. This honor was bestowed in recognition of their work on the PICS project (see page 3), which has substantially improved food security in Burkina Faso. This is the highest order given by the Burkinabé government to anyone—citizen or foreigner. In the United States this honor is approximately the equivalent of the Presidential Medal of Freedom.



Jess Lowenberg-DeBoer and Larry Murdock receive recognition on October 13, 2013, for their work on improved food security in Burkina Faso.

STUDY ABROAD

In 2012–13, 336 agriculture students traveled to all parts of the world and studied on every continent except Antarctica. Over 26% of our graduating undergraduates studied abroad prior to graduation. This continues to be the highest percentage of any college/school at Purdue.

We welcomed 21 international exchange students for a semester or year. These student exchanges from our partner universities enable our students to study at universities abroad that are involved in the exchanges. Students studying at Purdue were from Sweden, Ireland, Austria, England, Wales, Australia, Germany, Taiwan, and Brazil.

Thanks to the generosity of our supporters, scholarships and grants totaling \$18,300 were awarded through the office of International Programs in Agriculture (IPIA) to agriculture students who participated in a long-term program (eight weeks or longer) in 2012–13.

Another successful CoA Study Abroad Fair was held in September. Faculty who lead courses and students who had previously participated in a program were on hand to promote the various courses and programs offered to our students. This was an excellent opportunity for students to discuss all options available to them.



Purdue offered its first bilingual study-abroad course with the Technological University of Pereira (UTP). Here, students meet UTP Rector Luis E. Arango (third from the right).

Several new courses were offered for the first time in 2012–13: Global Sustainability Issues in Costa Rica; Veterinary Medicine, Research and Animal Production in Ukraine (with the School for Veterinary Medicine); and Colombia: Food Security and Sustainable Development. Students also traveled to Kenya in the summer as part of an agronomy course, African Development Activities.

Our International Agriculture Ambassadors were busy this year. In addition to talking with students at fairs and in the classroom, and helping with visitors to IPIA, they also hosted a booth at Spring Fest and hosted the International Food Festival on campus for International Week. The ambassadors for 2012–13 were:

Colleen Hartel—Forestry and Natural Resources

Rachael James—Animal Sciences

Fangying (Annie) Li—Food Science

Ashley Norris—Animal Sciences

Kristyna Oates—Animal Sciences

Brittany Stevers—Natural Resources and Environmental Science

Xun (Anna) Zhon—Agricultural and Biological Engineering

Alexis Zobel—Biochemistry

INTERNATIONAL EXTENSION

Three Extension educators, working in collaboration with the Felege Hiywot Center, an Ethiopian community center in Indianapolis, traveled to Addis Ababa, Ethiopia, to provide technical assistance for gardening, dairy, and product marketing activities at an orphanage and school that is supported by the Indianapolis community. As part of an Indiana state delegation, three Extension professionals participated in a week of dialogue and workshops around agricultural and rural development in the Republic of Georgia. A new three-year Farmer-to-Farmer project with Winrock International began in Guinea, West Africa. Titled Agricultural Education and Market Improvement Program (AEMIP), the initiative involves working with the Institute for Agricultural and Veterinary Sciences in developing new curricula, along with assisting farmer groups in improved marketing of their products. To learn more about International Extension, go to: <https://ag.purdue.edu/ipia/Pages/extension.aspx>

REGIONAL INTERNATIONAL PARTNERSHIP EFFORTS

Asia

The CoA continued to strengthen existing and explore new collaborations in China, India, and Indonesia. Dean Jay Akridge and K. Raghothama (IPIA) led a group of department heads and faculty to visit research facilities in Shanghai and to attend a research symposium at the Purdue-China Agriculture University Joint Research Center in Beijing. Several Purdue faculty members presented at the symposium. A smaller delegation then visited Northwest Agriculture and Forestry University (NWFU) in Yangling to foster developing research collaborations. Late in 2012, Raghothama (IPIA) and a Purdue team visited Sinar Mas Forestry and Bogor Agricultural University in Indonesia to initiate research interactions. Finally in spring of 2013, Raghothama led a group of Purdue researchers and administrators to India for workshops at Punjab Agriculture University, Punjab, and University of Agriculture Sciences, Bangalore. They also explored research opportunities with Indian Council of Agriculture, New Delhi, and private sector partners.

Latin America

CoA activities in Latin America continued to expand during 2012–13. Adriela Fernandez (International Programs in Agriculture) and five professors (Jeff Stuart and Catherine Hill from Entomology, Osvaldo Campanella from Agricultural and Biological Engineering, Janna Beckerman and Kevin Gibson from Botany and Plant Pathology) visited six universities and three research institutions in Bogota, Cali, Pereira, Manizales, and Medellin, Colombia. Fernandez's interactions during this trip led to the launch of Purdue's first bilingual study-abroad course, which was offered Maymester 2013 by the Department Agricultural Economics. Fernandez and Colombian colleagues at the Universidad Tecnologia de Periera (UTP) and the Universidad de Caldas (Caldas) designed, planned, and co-taught the course focused on food security and sustainable

development to Purdue and Colombia students. The aforementioned trip also led to an invitation for the college to participate in the 50-year anniversary celebration of Agronomy at the Universidad Nacional (UNAL), the largest public university in Colombia.

INTERDISCIPLINARY INTERNATIONAL EFFORTS

Advancing Afghan Agriculture Alliance (A4) and Other Related Activities

www.purdue.edu/afghanistan

Purdue Agriculture continues to be heavily involved in capacity building in Afghanistan. Purdue faculty and staff worked closely with the Ministry of Agriculture, Irrigation, and Livestock (MAIL) and Ministry of Public Health (MoPH) to identify and address needs and gaps within these departments with funding from USAID, USDA, and the Council for International Exchange of Scholars (CIES).

The second year of the Afghanistan Agricultural Extension Project (AAEP) in Herat was marked by strengthened collaboration with the Afghan MAIL. Purdue expatriate staff, including Raymond Clark, Sevanne Calsoyas, and Joseph Stangl, have been working hard to provide extension training to MAIL staff and their provincial counterparts on topics of Arid Water Management; Integrated Pest Management (IPM); Fertilizer Amendment; Conservation Agriculture; Grain Storage; Livestock; Locus and Sun Pests; and Saffron Processing, Packaging and Marketing. The AAEP program has established a teaching farm in Herat that it uses for training Afghan extension staff.

Purdue faculty from the Departments of Entomology and Food Science and the College of Veterinary Medicine provided training in sanitary/phytosanitary topics (food safety, plant disease diagnostics, pest identification, and animal health) to MAIL and Ministry of Public Health (MoPH) staff members. Tom Creswell (Botany and Plant Pathology) and Rick Foster (Entomology) hosted the MAIL Director of Plant Pathology for two months for intensive critical training to equip him to return and disseminate the information among his colleagues. Haley Oliver (Food Science) worked collaboratively with colleague Yeşim Soyer at Middle East Technical University (METU) in Turkey to provide a three-week basic food microbiology training for 10 MAIL and MoPH employees. She also provided sanitation and food safety training in Afghanistan.

The Strengthening Afghanistan Agricultural Faculties (SAAF) project is currently supporting 28 Afghan faculty pursuing graduate degrees in the United States and India. The 10 MS and PhD students at Purdue are studying agricultural economics, agronomy, animal science, entomology, forestry, horticulture, plant protection, and youth development and agricultural education.

Purdue hosted 13 Afghan visiting scholars from multiple Afghan universities through the Afghan Junior Faculty Development Program (AJFDP). These visiting scholars spent seven weeks at Purdue developing pedagogical skills and gaining insight into the American system of higher education. Tailored programs were delivered by George Van Scoyoc (Agronomy), Janet Ayres (Agricultural Economics), and Jerry Peters (Youth Development and Agricultural Education), as well as other partners across the university. Purdue continued involvement in Strengthening Extension Skills of Young Professionals in Afghanistan and Pakistan (AfPak) with Jerry Peters (Youth Development and Agricultural Education) traveling to Pakistan to provide extension training.

Kenya—AMPATH

Stephen Weller (Horticulture and Landscape Architecture) supervised Pamela Obura, associate director of agriculture programs for The Family Preservation Initiative (FPI) under the Academic Model Providing Access to Healthcare (AMPATH) program. This project, in its fourth year, promoted farm diversification and improved income and food security of AMPATH smallholder farm families. Obura was involved in agriculture production training of farmers and FPI's agricultural extension staff emphasizing improved production practices in maize, bean, vegetables, and fruit (emphasizing sustainable soil management). Weller, Maria Marshall (Agricultural Economics), Steve Yaninek (Entomology), Gary Burniske (Center for Global Food Security) and Darrell Schulze (Agronomy) sent four Purdue students to Kenya for a 10-week summer internship experience working with Obura on the Horticulture CRSP and a Purdue University Global Policy Research Institute (GPRI) proposal "Leading with Knowledge." The program empowers communities to attain food security, proper nutrition, good health, and economic growth for families with HIV in Western Kenya.



Under the direction of Steve Weller, Gary Burniske, and Kenyan collaborator Naman Nybinda, four Purdue students worked in Kenya on a summer internship. (left to right: Gary Burniske, Joshua Minai, Steve Weller, Marcia Croft, Naman Nybinda, Frannie Einterz, J. Spencer Evans)

Purdue Improved Cowpea Storage (PICS) and Purdue Improved Crop Storage (PICS2)

<https://ag.purdue.edu/ipia/pics>

Purdue Improved Cowpea Storage (PICS): The original PICS project was granted a no-cost extension through June 30, 2014, to facilitate the outsourcing of trademark licensing to Lela Agro, a plastics manufacturer and leader in PICS bag manufacturing, based in Kano, Nigeria. They will oversee trademark agreements with other manufacturers and distributors in West and Central Africa.

Purdue Improved Crop Storage (PICS2): To bring systematic research to bear on the problem of storage of other crops in sub-Saharan Africa, PICS2 carried out systematic studies of the triple bagging technology for African crops other than cowpea. The objective was to lay the foundation for expanding the impacts and benefits of hermetic triple-bagging storage

technology (PICS bag). The PICS bags are shown to be effective in storing dry grain, including maize, wheat, common beans, peanuts, and sorghum. PICS2 research results are drawing interest from development partners and donors. In the last six months, Purdue has received two grants from USAID/Fintrac Partnering for Innovation to commercialize PICS technology in Rwanda and Kenya. The Gates Foundation awarded a PICS2 supplement to Purdue to initiate the manufacturing and testing of the technology in East and Southern Africa including Ethiopia, Uganda, Tanzania, Malawi, and Zambia. Producing the bags in East and Southern Africa will reduce the cost of acquiring them from West Africa.

USDA/FAS Borlaug Fellowships

IPIA staff assisted in matching international Borlaug Fellowship opportunities with Purdue faculty expertise. Purdue was selected to train two Borlaug Fellows: Alice Mweetwa from Zambia worked with co-mentors Cindy Nakatsu and Darrell Schulz (Agronomy) and Diane Stott (USDA-ARS National Soil Erosion Research Laboratory) and Niango Malick Ba from Burkina Faso who worked with Joe Huesing and Larry Murdock (Entomology). IPIA staff member Lonni Kucik served as Training Coordinator for the Fellows.

COLLABORATIVE RESEARCH SUPPORT PROGRAMS (CRSPs)

AquaFish CRSP

As of April 1, 2013, the Aquaculture & Fisheries Collaborative Research Support Program (AquaFish CRSP) began operating under a new name, “The Feed the Future Innovation Lab for Collaborative Research on Aquaculture & Fisheries” (AquaFish Innovation Lab). Kwamena Quagraine (Agricultural Economics) continued as lead primary investigator. His project involved Tanzania and Ghana. In Tanzania, a workshop was conducted to train farmers on fish farming. The training workshop was conducted in Kilosa and Mpwawa districts. A total of 41 farmers were trained, including 11 women. The farmers’ training included introduction to fish farming and its importance, pond construction, pond fertilization, transportation and stocking of fingerlings, fish feeds and feeding, integrated fish farming, fish harvesting, and record keeping. Kwamena Quagraine organized an AquaFish Innovation Africa Project Regional Meeting from July 5–7, 2013, at the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana. The meeting brought together researchers involved in the AquaFish Innovation Lab activities in Africa to foster linkages and collaborations, tapping into national synergies and leveraging. Participants worked to align research and outreach portfolios, synchronize efforts, and create synergies across the continent. Participants of the meeting were from U.S. institutions involved in the AquaFish Innovation Lab and institutions in Ghana, Uganda, Kenya, and Tanzania.

Global Nutrition CRSP

Jerry Shively (Agricultural Economics) completed his third year as a primary investigator on the Feed the Future Nutrition Innovation Lab project. His project’s goal is to understand and measure the connections between agricultural capacity, technology adoption, nutrition outcomes, and conditioning factors at levels of aggregation ranging from household to district levels. During the past year, research activities focused on linking several nationally representative datasets on child health outcomes and

living standards to remotely sensed satellite data. The research examines the connections between agricultural capacity and nutrition outcomes. Several graduate students in Agricultural Economics are supported by the project and conducting research in Nepal and Uganda.

Horticultural CRSP

Stephen Weller (Horticulture and Landscape Architecture), Maria Marshall (Agricultural Economics), Steve Yaninek (Entomology), and James Simon of Rutgers University finished the second year of a three-year HORT CRSP project titled “Sustainable African Indigenous Vegetable Production and Market Chain Development for Improved Health and Nutrition and Income Generation by Smallholder Farmers in Kenya, Tanzania, and Zambia.” The goal is to improve rural livelihoods and market access for smallholder farmers growing African Indigenous Vegetables (AIVs). The project introduced improved AIV germplasm, as well as improved production practices and training for AIVs, including amaranth, spider plant, and African nightshade—all known to be nutritiously rich and important components of a balanced diet. Other aspects of the project included analysis of AIVs for nutritional composition and development of improved recipes for AIVs. African partners include AMPATH, Eldoret University and KARI in Kenya; AVRDC, St. Johns University, Sokoine University, and the Horticulture Research Institute in Tanzania; and ASNAPP in Zambia. Other collaborators include Fintrac and Ministries of Agriculture in our partner countries.



A Kenyan woman sells nutritious spider plants in an open-air market. A three-year Horticulture CRSP project improves rural livelihoods by promoting production of sustainable African indigenous vegetables, including spider plants.

Integrated Pest Management (IPM) CRSP

Stephen Weller (Horticulture and Landscape Architecture) and Rick Foster (Entomology) continued collaboration with partners in Honduras to develop Integrated Pest Management (IPM) packages to reduce pest problems and the use of synthetic pesticides in horticulture crops under the USAID IPM CRSP program. Their research emphasized solarization for reducing purple nutsedge and root knot nematodes in production fields, development of diagnostic keys for major viruses that affect Solanaceous crops, and a pictorial guide for late blight disease of Solanaceous crops to help small growers make better disease management decisions. A key outcome of the project has been the inclusion of an undergraduate internship program with Universidad Nacional de Agricultura (UNA, Catacamas, Olancho). Two students worked under the supervision of Foster and Weller on IPM projects in indigenous vegetable weed management and insect management in cabbage and sweet corn. The internship met the research part of their senior thesis requirement. David Perla, a Honduran, continued his master's studies at Purdue in the Entomology Department investigating nematode management strategies with Virginia Ferris.

NEWS OF THE DEPARTMENTS

Agricultural and Biological Engineering

Dennis Buckmaster visited Inner Mongolia Agricultural University (IMAU) of Hohhot, China, to attend the International Forum on Higher Education and Social Development. He also taught a one-credit fluid power technology course to juniors in mechanical and electrical engineering (in English) and attended IMAU's 60th anniversary celebration and ceremonies as part of the international VIP delegation.

William Field spent a week in Ragusa, Sicily, at a meeting of Mediterranean countries working to improve the safety and health of agricultural producers in the region. He was able to team up with Remigio Berruto (Purdue PhD alumnus) on the planning committee. Field was a keynote presenter and also presented workshops on bull safety, confined spaces in agricultural incidents, and modifying agricultural equipment for farmers with disabilities. Field also spent a week at the Swedish Institute for Agricultural and Environmental Engineering located in Uppsala, just north of Stockholm. This was his third trip there to work on projects related to the effects of cold on farmers with disabilities, bull-handling safety, and injuries associated with raising beef cattle on pasture. While there, a proposal was written for a pilot study to explore the impact of disabilities on Swedish farmers. Word was received that the proposal was selected for funding. During his visit, Field spent time meeting with graduate students and spent a day at the beef operation that raises bulls for specialty products.

Klein Ileleji and **Jiqin Ni** traveled to Guyana in August 2012 to give lectures at a four-day workshop on bioenergy development. The workshop also included a one-day field trip to visit a wood processing plant, a biomethanisation plant, and two on-farm manure digester systems. The workshop concluded with a session on extension outreach at Purdue University and a discussion of the opportunities to build extension outreach in Guyana. Over 35 representatives from agriculture agencies, technical institutes, ministries, and private entrepreneurs attended the workshop in Georgetown, the capital of the South American country. This international extension activity was an integral part of a program, Expanding Bioenergy Opportunities in Guyana, sponsored by the Guyana Ministry of Agriculture and the Inter-American Development Bank. Clairmont Clementson, a 2010

PhD graduate from Purdue's Agricultural and Biological Engineering Department and leader of the bioenergy program in the Guyana Ministry of Agriculture, coordinated the workshop.

Joseph Irudayaraj and **Jiqin Ni** traveled to China in November 2012 with a Purdue University delegation led by Mark Van Fleet of Global Business Engagement, Purdue University Office of Engagement, to explore technology transfer and commercialization opportunities. Irudayaraj visited Chengdu City, Sichuan Province and Jiaxing City, Zhejiang Province with the delegation, which also included two other Purdue professors: Riyi Shi of the College of Veterinary Medicine and Henry Zhang of the Department of Mechanical Engineering Technology. Ping Poulsen, President of Safis Solutions LLC (Indianapolis), was also present to promote Indiana business.

Faculty members **Monika Ivantysynova** and **Andrea Vacca**, PhD student Marco Zecchi, and visiting scholar Junjie Zhou presented papers at the 8th Annual International Conference on Fluid Power Transmission and Control April 9–11, 2013, at Zhejiang University in Hangzhou, China. Ivantysynova, Vacca, Zecchi, Mike Sprengel (PhD candidate), Timothy Opperwall (PhD candidate), and Naseem Daher (PhD candidate) presented at the 13th Annual Scandinavian International Conference on Fluid Power June 3–5 at Linköping University in Linköping, Sweden.

Jenna Rickus visited ETH Zurich (Swiss Federal Institute of Technology in Zurich) as part of a research collaboration and to set up a student exchange program between Purdue Agricultural and Biological Engineering and the Biosystems Science and Engineering Department at ETH Zurich. The first goal is to exchange two undergraduate students for one semester in the Spring of 2014.

Two graduate students received recognition at the 7th Fluid Power Network International (FPNI) PhD Symposium. Andrew Shenck won the Backe Medal for his paper "The Influence of Swashplate Elastohydrodynamic Deformation in the Slipper-Swashplate Interface." Marco Zecchi's paper "An investigation of the impact of micro surface shaping on the cylinder block/valve plate inter-face performance through a novel thermo-elasto-hydrodynamic model" received the distinguished paper recognition award.

Agricultural Economics

The Center for Food and Agricultural Business (CAB) staff visited Brazil, the Philippines, Switzerland, and Australia, and conducted a program in North America to help company managers deepen relationships with farmers. Purdue faculty worked with farmers in these countries and led discussions to facilitate the exchange of information about how farm businesses are changing. **Allan Gray**, **Michael Gunderson**, **Scott Downey**, and **David Downey** were active with these CAB programs.

Corinne Alexander traveled to Rwanda the first two weeks of January to work with Michael Jones, a former Purdue master's student and Fulbright Scholar. They worked with OneAcreFund in Rwanda to develop a controlled experiment to document the impact of PICS with Rwandan farmers. Alexander also traveled to Malawi and Tanzania as part of the PICS2 roadshow where the Purdue team reported the research results to government officials, university professors, and non-governmental organizations. One major goal of the roadshow was to find plastics manufacturers who would be viable partners for PICS and to find partners who would collaborate on introducing the PICS technology to smallholder farmers. Alexander presented the paper "To Certify or Not to Certify? Decomposing the Organic Production and Certification Decisions" at the

Australian Agricultural Resource Economics Society meetings in Sydney, February 5–8, 2013, and at a departmental seminar at Lincoln University, Christchurch, New Zealand. While in New Zealand, Alexander visited with the Foundation for Arable Research and presented an outlook program on commodity grain prices to the largest maize growers on the north island.

Michael Delgado traveled to the annual summer conference of the Association of Environmental and Resource Economists in Alberta, Canada, to present his work on hybrid car ownership and social status signaling. He also attended the China Meeting of the Econometric Society in Beijing, China, and the Asian Meeting of the Econometric Society in Singapore to present his work on the nonparametric generalized method of moments estimation for semiparametric systems of simultaneous equations.

W. Scott Downey led a Maymester course with eight students to Italy to study the production and marketing of small farm food products. The students spent eight days visiting with producers of wines, olive oils, preserved meats, and cheeses. A highlight of the trip was a visit to Il Forteto, a cooperative farm business and retailer that ships cheeses all over the world. The organization specializes in production from Chianina cows, a very large breed unique to the area. Students also worked with the head chef at Villa Campestri to understand the role these foods play in local culture. The study tour concluded with a visit to Florence, Italy, where students spent time with a local historian who helped them understand the context of some of the important sites in the city. The students were surprised to learn that Italy is a younger country than the United States and to understand the implications of this history for Italy's current economic challenges.

Adriela Fernandez presented a paper titled "Towards a Sustainable Strategy for International Teaching," at CONAHEC's 15th North American Higher Education Conference, Towards a Sustainable Future: The Role of International Education, held May 2013 in Edmonton, Canada. Her paper featured the new innovative bilingual Colombia study-abroad course. Fernandez was invited to be part of the panel "Women Changing the World," organized on International Women's Day 2013 by the Susan Bulkeley Butler Center for Leadership Excellence and the Center for Research on Diversity and Inclusion, and sponsored by the Global Policy Institute.

Joan Fulton, working with Purdue alumnus Tahirou Abdoulaye from International Institute for Tropical Agriculture (IITA), and Prince Maxwell Etwire (SCIR/SARI in Ghana), led a workshop where over eighty individuals received training on seed and input marketing in Nigeria and Ghana in the spring of 2013. The program was adapted from Purdue's Bigger Profits



Joan Fulton (front, center) led a workshop on seed and input marketing in Nigeria and Ghana in the spring of 2013.

Through Targeted Sales workshop specifically for West African seed and input supply companies. The participants were from seed and input supply companies. The effective participation of seed companies in the value chain offers farmers easier access to improved seeds and helps improve their productivity and incomes. An additional training program is planned for Mali in 2013.

Kenneth Foster and Ag Econ students Tia McDonald, Kevin Camp, and Celeste Sununtasuk, participated in a service learning course designed to develop and implement a community-scale sustainable water treatment system in Las Canas, Dominican Republic. The multidisciplinary course



During spring break of 2013, agricultural economics students and faculty laid the groundwork for a community-scale, sustainable water treatment system in Las Canas, Dominican Republic.

included students and faculty from the Colleges of Agriculture, Engineering, Nursing, and Science. Foster was one of the co-instructors. Nineteen students and faculty traveled to Las Canas over spring break to lay the groundwork and will return in 2013–14 to implement the project and train local leaders in hygiene, system management, and economic sustainability.

Thomas Hertel was on Swedish TV in June in connection with a session on Foreign Aid and Our Changing Environment held in Stockholm June 4, 2013. Hertel spoke on the question of public goods associated with global land use. This was organized by the United Nations University World Institute for Development Economics Research (UNU-WIDER). The audience, including the Ministers of Development from Denmark and Sweden, played the role of discussants. Following is the link to the talk: <http://www1.wider.unu.edu/recomenvironment/article/video-aid-and-our-changing-environment-part-i>

Roman Keeney spent the spring semester in Bonn, Germany, serving as a visiting faculty member of the University of Bonn with the Institute for Agricultural and Resource Economics. Keeney worked with the agricultural policy modeling team at the institute on issues related to the modeling of agri-environmental policy, specifically in the area of greenhouse gas (GHG) abatement options and costs. Working with Amber Remble (PhD candidate from Purdue, another visitor to the institute), Keeney constructed a new module for analysis of crop production systems following the template of the institute's existing dairy production model with GHG accounting. Through ongoing collaboration with institute researchers, Keeney is seeking to integrate the dairy and crop production systems to provide improved analysis of the true economic costs of GHG-based environmental regulation.

Maria Marshall traveled to Kenya, Tanzania, and Zambia in November 2012 while on sabbatical leave to analyze data from the Horticulture CRSP grant. She continued to seek funding to extend work in Africa. Marshall was part of a multidisciplinary team that applied for and received a Global Policy Research Institute grant titled, “Leading with Knowledge-Empowering Communities to Attain Food Security, Proper Nutrition, Good Health, and Economic Growth for Families with HIV in Western Kenya.” Marshall presented material related to the USDA-AFRI grant at the Family Firm Institute Conference in Brussels, Belgium, in October 2012. “The Impact of Role Satisfaction and Conflict on Succession Planning” was a selected presentation related to family business conflict and succession planning.

Kwamena Quagrainie and **Jennifer Dennis** continued on the AquaFish CRSP—and their summary is found in previous CRSP section.

Jacob Ricker-Gilbert’s international activities in 2012–13 featured two main highlights. First, he obtained a grant called Guiding Investments in Sustainable Agricultural Intensification in Africa (GISAIA). The grant is funded by the Bill and Melinda Gates Foundation through Michigan State University and focuses on smallholder agriculture issues in Malawi, located in Southern/Eastern Africa. Under GISAIA, Ricker-Gilbert is working with colleagues at Bunda College in Malawi and the World Bank to address issues surrounding the country’s large scale input subsidy program that makes fertilizer and maize seed available to farmers at a greatly reduced price. The project’s goal is to disseminate information to policy makers and donors in Malawi about the impacts of the country’s input subsidy program. The project staff members also intend to come up with recommendations to make the subsidy program more effective, sustainable, and lower cost. Ricker-Gilbert was also invited by the Inter-American Development Bank to serve as an international expert for Guatemala as the country conducted an evaluation of their input subsidy program, which is similar to the input subsidy program in Malawi. Ricker-Gilbert spent a week in Guatemala City during December 2012 working with colleagues at the University of Rafael Landivar on the evaluation. At the end of the week, he presented his findings to officials at the Guatemalan Ministry of Agriculture and the Inter-American Development Bank. His analysis also contributed to a policy report and an article in the popular press in Guatemala on the subsidy program’s impacts.

John Sanders and Botorou Ouendeba continued their on-farm work in Burkina Faso and Niger with McKnight funding. The objective of this fieldwork was to introduce new sorghum-millet production and marketing technologies. This technology system was produced on approximately 400 farms in this crop year with our direct support in collaboration with the national agricultural research organizations, INERA and INRAN. In Burkina Faso, various private and public agencies began scaling up this system in 2013. The Ministry of Agriculture distributed seed of Grinkan and fertilizer with our “fiche technique” (agronomy and marketing recommendations) for approximately 1,000 ha in small packages. A private seed company (NEFASO) sold all the Grinkan from 80 ha of their 2012 production. A bulletin and a journal article submission were finished on this project in 2013. Two of our graduate students participated in the Agricultural & Applied Economics Association (AAEA) meetings and presented a paper and a poster on our fieldwork and impact study respectively.

Juan Sesmero presented his selected paper “Environmental Efficiency Among Corn Ethanol Plants” at the 2012 Triennial Meeting of the International Agricultural Economics Association, Foz do Iguaçu, Brazil, August 2012.

Gerald Shively continued to maintain a very active schedule of international activities. His research projects on food security in Uganda and Nepal funded by the USAID Nutrition Innovation Lab are discussed in the previous CRSP section. He continued to partner with a number of colleagues on agricultural development research in other locations, including China, Ethiopia, the Philippines, Malawi, and elsewhere. He currently serves on a C-FARE Blue Ribbon Panel formed to study frontier issues in agricultural development. Shively continued to serve as Editor-in-Chief of *Agricultural Economics*, the flagship journal of the International Association of Agricultural Economists.

Wallace E. Tyner gave a presentation at a bioenergy conference in the Netherlands. He also met with key European Commission officials in Belgium on biofuel policy issues.

Nelson Villoria presented “GEOSHARE and HUBzero: An Open Platform for Spatial Data Development and Analysis” to the participants in the Africa Agriculture GIS Week (AAGW) and annual meeting of the CGIAR Consortium for Spatial Information (CGIAR-CSI) held in Addis Ababa, Ethiopia, on March 12–14, 2013. He also presented his work on “Global Food Security in a Teleconnected World: The Role of Variable Trade Policy and Early Warnings in Mitigating the Global Effects of El Nino Southern Oscillation” at the 16th Annual Conference on Global Economic Analysis held in Shanghai, China, June 12–14, 2013.

Brigitte Waldorf attended a workshop on spatial segregation of immigrants, entitled “Soort zoekt soort: sociaal-economische schijdslijnen in Nederland,” organized by the Department of Spatial Economics at the VU University Amsterdam, The Netherlands, June 2013. Waldorf continued her collaboration with Jacques Poot of the New Zealand Institute of Demographic and Economic Analysis (NIDEA), University of Waikato, New Zealand, on the spatio-temporal dynamics of high-skilled immigrants.

Holly Wang delivered two invited talks on food safety at MTT, Agriculture Research of Finland, Helsinki, Finland, and at University of Copenhagen, Denmark, in November 2012. She also presented papers at five international conferences, including Agricultural Economics Association Annual Conference in Brazil, August 2012; US-China Eco-Partnership Conference in Shenyang, China, September 2012; CAER-IFPRI Annual Conference, Beijing, China, October 2012; Chinese Economists Society’s (CES) Presidential Forum in Kunming, China, December 2012; and CES Annual Conference in Chengdu, China, June 2013.

Wang led her study-abroad class to China in May 2013 for two weeks; during June 2013 conducted a field survey in four different cities in China about the Chinese market for Indian poultry; and gave invited seminars at the Chinese Academy of Science, Beijing; Zhejiang University, Hangzhou; and Southwest University of Finance and Economics, Chengdu.

Agronomy

Purdue’s College of Agriculture plans to grow their relationship with Indian agricultural institutions. Four from agronomy were a part of a group that traveled to India April 29 through May 10, 2013, to establish stronger relationships with three Indian agricultural institutions. The travelers included: K. Raghothama (IPIA), Karen Plaut (OAP), **Joe Anderson**, **Mitch Tuinstra**, Indrajeet Chaubey (Agricultural and Biological Engineering), Charles Woloshuk (Botany and Plant Pathology), Alex Renaud (Agronomy graduate student), and Ryan Gibson (Agronomy PhD candidate).

Gebisa Ejeta, 2011 World Food Prize winner, continued to be in great demand. He presented an invited research seminar “Meeting National Development Challenges through Sciences, Technology and Innovation” at Jimma University in Jimma, Ethiopia, July 2012, and received an honorary doctorate from Jimma University. He gave an invited keynote seminar “Plant breeding: the science to bet on for achieving food security in Africa” at the Alliance for a Green Revolution in Africa Plant Breeder Conference, Nairobi, Kenya. He served as a panelist for the Building the Foundations for Rapid Growth in Agricultural Productivity session at the African Green Revolution Forum 2012, Alliance for a Green Revolution in Africa held September 2012 in Arusha, Tanzania. Ejeta also traveled to Gates Foundation Striga research project meetings in Addis Ababa, Dire Dawa, and Nazret, Ethiopia; Nairobi, Kenya; and Arusha, Tanzania.

Richard Grant was named a Distinguished Professor by the Mexican Academy of Sciences. In July 2012, he conducted a graduate student workshop on Measuring Greenhouse Gases in Agriculture, at the Postgraduate College, Texcoco, Mexico. He also presented a research paper entitled “The science of measuring emissions of greenhouse gases” at the international workshop Update on Sustainable Management Schemes of Waste and Climate Change at the National Institute of Ecology, Federal Ministry of the Environment and Natural Resource (SEMARNAT) in Mexico City, Mexico, July 2012. This paper was invited to assist in the improvement of the Mexican Greenhouse Gas Inventory Assessment from Intergovernmental Panel on Climate Change (IPCC) Tier-1 methodologies to Tier-2 methodologies.

Yiwei Jiang was an invited speaker at The First International Summit Forum on Turfgrass Science Development Strategy, Wuhan Botanical Garden, Chinese Academy of Sciences, Wuhan, China, July 2012. His research presentation was “Candidate gene association mapping of drought tolerance in perennial ryegrass.”

Brad Joern gave an invited research lecture titled “Rethinking approaches for making nitrogen, phosphorus, and potassium recommendations: Are there benefits to a regional or modeling approaches for making fertilizer recommendations?” at Lavall University/Agriculture Canada, in Quebec City in February 2012.

Cliff T. Johnston served as chair and curator of the Source Clays Repository (SCR). The SCR is operated under The Clay Minerals Society and provides well characterized mineral samples to the clay research community through the world.

Cindy Nakatsu hosted a Borlaug Fellow from Zambia from August to December 2012 and traveled to Zambia in May 2013 for a reciprocal mentor visit to continue work with the Fellow.



Cindy Nakatsu (right) mentored Alice Mweetwa, a Borlaug Fellow from Zambia.

Dev Niyogi was asked to do a research presentation at the International Conference on Urban Climatology held at Trinity College, Dublin, Ireland. He was also invited to give a research talk on landfalling tropical cyclones (three lectures) as part of an Indo-U.S. Workshop on Tropical Cyclones, Technology, Bhubaneswar, Orissa, India.

Jianxin Ma was invited to present research lectures on evolutionary propensities of the soybean genome to the Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, China, July 23, 2012, and at the Institute of Crop Sciences, Chinese Academy of Agricultural Sciences, Beijing, China, July 24, 2012.

Phillip Owens' sabbatical leave was spent working as a visiting scientist at the Center for International Agriculture in the Tropics (CIAT) in Cali, Colombia, from August 15, 2012, to May 15, 2013. The mission of CIAT is to reduce hunger and poverty and to improve human health in the tropics through research aimed at increasing the eco-efficiency of agriculture. CIAT is a member of the CGIAR Consortium.

Darrell Schulze arranged a 10-week summer internship for five students to work in Eldoret, Kenya, with colleagues at AMPATH and at Moi University. AMPATH (<http://www.ampathkenya.org/>), a partnership between Moi University School of Medicine and a consortium of U.S. universities lead by Indiana University's School of Medicine, treats more than 140,000 HIV-positive persons at over 60 urban and rural clinics sites throughout western Kenya and operates the largest feeding program anywhere in the world. Schulz traveled with the students to help with their work set-up and acclimation. Four of the students worked with the Agricultural Extension Program of AMPATH's Family Preservation Initiative under the supervision of Pamela Obura (PhD, soil science, 2008) and Nyabinda Naman Ondego, while one student worked with the Soil Science Department at Chepkoilel University College.

Mitch Tuinstra was part of the team that traveled to India. The group visited several different universities in northern and southern India, but Tuinstra highlighted the discussions with the University of Agricultural Sciences (UAS), Bangalore; University of Horticulture Science (UHS), Bagalkot; and Punjab Agriculture University (PAU). Although the Purdue College of Agriculture already has a relationship with these institutions, growing the relationship in areas of joint research, educational programs, private sector participation, and joint workshops was a priority.

Animal Sciences

Layi Adeola led workshops in Copenhagen, Denmark, and gave plenary talks at the European Symposium on Poultry Nutrition in Potsdam, Germany, and the International Poultry Meat in Antalya, Turkey. He attended conferences in Rome, Italy, and Salvador, Brazil. Presentations were given in Beijing, China; Puerto Vallarta, Mexico; and Changsha, China. He discussed nutrition studies in Nigeria and amino acid utilization studies in Sao Paulo, Brazil. He also hosted visiting scholars from Porto Alegre, Brazil; Ibadan, Nigeria; Hunan, China; Scotland, United Kingdom; and Ya'an, Sichuan, China.

Todd Applegate presented invited talks on intestinal nutrient use and gut integrity in Beijing, China; Singapore; Vienna, Austria; Rome, Italy; Trujillo and Lima, Peru; and Ya'an, Sichuan province, China. He also served as an examiner for PhD students in New Zealand and Sichuan province, China. Additionally, for 12 months Applegate hosted a PhD student from China Agricultural University who was studying dietary nutrient needs during immunological stress.

Jeremy Marchant Forde attended the 47th Congress of the International Society for Applied Ethology, in Florianopolis, Brazil, where he was elected President of the Society for 2013–2015. He also visited the Key Laboratory in Animal Physiology and Biochemistry at Nanjing Agricultural University, China, where he gave two seminars and discussed future collaboration in the area of farm animal welfare research and teaching.

Dale Forsyth teaches a distance education online course (ANSC 221) that has been taken by students from 17 foreign countries including England, Puerto Rico, Canada, Singapore, Kyrgyzstan, Scotland, Hong Kong, Cyprus, India, Germany, Denmark, Virgin Islands, Grenada, Jamaica, Turkey, Japan, South Korea, and South Africa. The course has also generated interest from students in Kenya, Australia, Sri Lanka, and Lesotho.

Patricia “Scotti” Hester presented a proceedings paper at the XXIV World’s Poultry Congress in Salvador, Brazil, in August, 2012. Hester and **Heng-wei Cheng** co-hosted a graduate student, Sha Jiang, from Nanjing Agricultural University, who is currently a lecturer at the College of Animal Science and Technology of Xinan University, Beibei District, Chongqing, China.

In November 2012, **Tamilee Nennich** was invited to Hangzhou and Shanghai, China, to present information on dairy nutrition to graduate students, dairy farmers, and dairy nutritionists. Information on dairy heifer nutrition, protein metabolism, and dairy farm nutrient management was presented to graduate students at Zhejiang University in Hangzhou. Nennich also presented a talk to 75 dairy farm managers and workers at an industry meeting outside of Hangzhou. Nennich then traveled to Shanghai, where she presented information on nutritional feeding strategies of dairy calves, heifers, and cows to dairy cattle nutritionists and farm managers.

Mark Russell collaborated with Haley Oliver (Food Science) in teaching *Animals & Food Security: Service Learning in Haiti*. Through this course, they took 18 students to Haiti during winter break to partner with the Université de Antenor Firmin (UNAF) in Cap-Haitien, Centre technique d’entreprenariat agricole et de Développement (CTEAD) program and Heifer International-Haiti on an ongoing project. Students learned the principles of extension methodology, sustainable development, and how to most effectively work with local community leaders. Russell and **Paul Ebner** conducted the course *Animals and Food Security: Service Learning in Romania*. Using the Heifer International model, 18 Purdue students and seven students from University of Agricultural Sciences and Veterinary



Students taking a summer, service-learning course led by Paul Ebner and Mark Russell stayed with a host family in Romania and worked for Heifer International.

Medicine at Timisoara learned the principles of extension methodology, sustainable development, and how to most effectively work with Romanian livestock producers to design and implement projects that provide long-term benefit to their communities.

Michael Schutz was an invited speaker at the 2012 annual meeting of the European Association of Animal Production where he presented an overview of recent work on the development of genetic selection indexes for pasture-based dairy producers. He also participated in a symposium on dairy production in Eastern Europe, presenting information about a survey of grazing practices and genetic selection preferences of Romanian dairy farmers.

Biochemistry

Clint Chapple traveled to Florence, Italy, to attend the XXVI International Conference of Polyphenols and present a talk entitled, “Phenylpropanoid metabolism in *Arabidopsis*.”

Natalia Dudareva traveled to Kolymvari, Crete, Greece, where she presented an invited talk entitled, “Do we need to rethink the ‘canonical’ MVA pathway?” at the 2013 Terpene meeting. She also travelled to Busan, Korea, where she presented a talk entitled, “New insights into the regulation of carbon flux toward primary and secondary metabolites in plants” at the 2013 International Symposium and Annual Meeting of the Korean Society for Applied Biological Chemistry (KSABC).

Barbara Golden traveled to Davos, Switzerland, to attend the 18th Annual International Meeting of the RNA Society and help with the planning the 2014 meeting.

Ann Kirchmaier traveled to Lucca (Barga), Italy, where she presented a talk entitled, “Creating Genome Wide Patterns in Chromatin One Nucleosome at a Time” at the 2013 Gordon Conference on Chromosome Dynamics.

Xiaoqi Liu welcomed three Chinese visiting scholars and one Chinese postdoctoral research assistant to his lab. These included Yuehong Yang a faculty member at Zhejiang University, School of Basic Medicine, Hangzhou; Zhe Zhang from Shandong, who is currently a graduate student at the State Key Laboratories for Agrobiotechnology in the Department of Microbiology & Immunology at China Agricultural University; Xinyuan Xu from Tianjin, who is currently a graduate student in the Department of Chemistry at China Agricultural University and is co-mentored by Liu and Shihuan Kuang (Animal Sciences); and Zhenyou Zou a postdoctoral research assistant from Pingxiang, who received his PhD from the Life Science School of Nanjing University.

Joe Ogas continues his collaboration with Kim Boutilier’s group at Plant Research International in the Netherlands.

Andy Tao traveled to Taiwan to attend the 4th World Chinese Mass Spectrometry Consortium (WCMSC) and presented a keynote talk entitled, “Integrated proteomic strategies for analyzing molecular signaling.” He also traveled to Shanghai, China, working in collaboration with the Chinese Academy of Science. In May he returned to China for four weeks and presented a talk, “Sorting information in the proteome world” at Zhongnan University in Changsha; attended the Purdue University Northwest Agriculture and Forestry University symposium in Yangling and presented a talk, “Developing tools to study molecular signaling in plants”; visited the Chinese Academy of Science (CAS) in Beijing to present a talk, “Proteomic tools and strategies to study molecular signaling”; and gave a talk, “Chemical proteomics to study molecular signaling” at Nankai University in

Tianjin. He also joined a Purdue delegation to discuss technology transfer with local officials in Tianjin, Beijing, and Shanghai.

Beth Tran is collaborating with Katja Strasser in Munich, Germany, at the Ludwig-Maximilian University, Gene Center (scientific). She was acknowledged in a recent publication of Strasser's for her editorial assistance. The paper was recently accepted. Tran and graduate student Kit Ma traveled to Davos, Switzerland, to attend the 18th Annual International Meeting of the RNA Society. Tran organized the approximately 400-person mentoring luncheon at this event. Ma presented a poster entitled "The DEAD-box Protein Dbp2 Functions with the RNA binding Protein Yra1 to Promote mRNP Assembly." Tran also traveled to Ludwig Maximilian University Gene Center in Munich, Germany, where she presented a seminar entitled "The Dynamic Roles of RNA Helicases and Long Noncoding RNAs in Eukaryotic Gene Regulation."

Botany and Plant Pathology

Zhixiang Chen and his group continued to collaborate with Jingquan Yu of Zhejiang University, China, on a range of projects including the roles of reactive oxygen species, brassinosteroids, autophagy, and WRKY/VQ transcription factors in plant defense and stress responses. Three papers describing the collaborative work were published in 2012 in *Plant Physiology*, *New Phytologist*, and *PLoS Genetics*. Chen also did a one-semester sabbatical in Yu's laboratory, during which they initiated a new collaborative project on functional analysis of soybean WRKY and VQ genes in resistance to cyst nematodes and drought tolerance.

Tom Creswell traveled to Afghanistan October 5–14, 2012, in support of the USDA-sponsored Afghanistan Agricultural Sanitary and Phytosanitary Project (AASPS), to conduct trainings on plant diagnostics and lab management best practices for members of the Ministry of Agriculture Irrigation and Livestock (MAIL) in Herat province. The five-day training was attended by 12 plant protection specialists from MAIL and included lectures on the fundamentals of plant disease diagnostics and hands-on laboratory training in basic techniques. The training was followed by a 1.5-day workshop on plant disease diagnostics and plant specimen collection. This workshop was presented to 25 Afghanistan Agricultural Extension Project (AAEP) personnel at a nearby demonstration farm and fruit crops plant nursery. Creswell concluded the trip in Kabul by consulting with the MAIL plant protection staff on setup of a newly constructed diagnostic lab and administrative building.

In June 2013, **Dan Egel** conducted IPM trainings in four cities in Afghanistan: Kabul, Mazar-i-Sharif, Jalalabad, and Herat. Each training covered applied information about disease and insect pests of specialty crops. There were 241 people, including 23 women, attending the four presentations. Each training was two days long. Pre- and posttests were given to each group. Overall, the test scores increased by 30% after the training. Raymond Clark, AAED Deputy Chief of Party, and Sayed Wahidullah Aqil, extension horticulturalist, played important parts in these presentations.

Rick Latin was the invited speaker at the British International Golf Greenskeepers Association in St. Andrews, Scotland, in July 2012. His presentation was titled "Turf Disease Management in the Midwestern U.S." Latin also conducted a two-day workshop on turf disease management in Tokyo, Japan, in January 2013. The attendees included turf managers and sales and distribution representatives from across the Asian turf industry.

Jin-Rong Xu organized a Purdue-Northwest Agriculture and Forestry University (NWAUFU) joint research symposium at Yangling, China, May 13–14, 2013. There were four speakers from Purdue and four from NWAUFU.

Nicholas Carpita continued collaborations with Marcos Buckeridge, University of Sao Paulo, Brazil, on plant biochemistry and genetics related to bioenergy crops. He led a Purdue contingent on a visit to Sao Paulo, Brazil, in November 2012 to hold a workshop on Plants and Bioenergy to encourage and promote research collaborations between Brazilian and Purdue scientists in Agriculture, Science, and Engineering. Carpita was part of a contingent from Agriculture, Science and Engineering, and Entrepreneurship, who visited scientists and engineers at the Russian Academy of Sciences and Kazan State University, Russia, in October 2012, to promote and establish research collaborations. He was also invited to chair a session on the plant cell wall and give a lecture at the International Arabidopsis meeting, Vienna, Austria, August 2012.

Entomology

Dieudonné Baributsa was very involved with international projects in Africa (PICS and PICS2) and in Afghanistan through the Afghan Agricultural Extension Project (AAEP). He organized Training of Trainers workshops for extension agents in Ngozi, Burundi (PICS2), and in Herat, Kabul, and Nangarhar, Afghanistan, (AAEP) to teach the basic skills used to implement PICS village activities. He served as an assessment/survey trainer in Afghanistan to prepare extension agents in four provinces to implement a survey to assess wheat storage losses. He organized "Follow-up of PICS2 research" meetings in Kenya, Rwanda, and Malawi with scientists from the International Center for Insect Physiology and Ecology (ICIPE) and the Kenya Agricultural Research Institute (KARI) in Kenya, N2 Africa project staff in Rwanda, and lecturers from Bunda College in Malawi. These partners conducted research to assess the efficacy of the PICS bags in reducing post-harvest losses of grain other than cowpea including maize, common bean, pigeon pea, and mungbean.

Baributsa also participated in vendor/business consultant, farmer groups and NGO workshops in Burkina Faso, Ghana, and Burundi discussing the PICS model, challenges and opportunities for supply chain development, and commercialization of PICS bags. Under the USAID Fintrac Partnering for Innovation, "Commercializing PICS bags in Rwanda," Baributsa organized a study tour in Burkina Faso and Niger for the staff of Ecoplastic Ltd, a plastic manufacturer commercializing PICS bags in Rwanda. The purpose of the study tour was to help Ecoplastic understand PICS efforts and draw lessons that could be useful in developing markets for the bags in Rwanda.

Baributsa served on two discussion panels at Washington, D.C., meetings, "Regional knowledge sharing" and "Food security and minimizing postharvest loss: markets, applied research and innovation," to share the PICS bag story and impact. He also organized a session "Improving Food Security While Addressing Food Safety" under the theme "Ensuring Food Safety and Sustainability" at the Cracking the Nut: Improving Rural Livelihoods and Food Security Conference in Dresden, Germany. Session presenters included Charlene McKoin, the PICS Gates Foundation Officer, and David Babayara, the Director of NU Image, a PICS media partner in Ghana.

Gary Bennett served as the Director of the Center for Urban and Industrial Pest Management (CUIPM) which has been involved in correspondence courses in urban and industrial IPM for over 50 years, with courses now online (as well as by correspondence) being taken by individuals from many foreign countries. The Introductory IPM is now available in Spanish (both the course and the textbook) and is being developed for use in Arabic. These courses provide training for technicians, managers, and owners of pest management companies, as well as for public health officials, building inspectors and maintenance personnel, and chemical company employees, and are available on an open enrollment basis.

Grzegorz Buczkowski traveled to Daegu, South Korea, in August of 2012 for an invited symposium talk. He presented a lecture on “Pest Ants of Urban Environments” at the XXIV International Congress of Entomology meeting. In February 2013, Buczkowski was invited to Stellenbosch, South Africa, to give an invited seminar in the Centre for Excellence in Invasion Biology (Department of Botany and Zoology) at the University of Stellenbosch. He also organized and taught an invited workshop entitled “Tracking Insects in Natural Habitats: The Use of Protein Marking in Applied Ecology Future Prospects.” The visit was funded by a grant from the South African National Research Foundation. The workshop introduced about 20 postgraduate honors students to protein marking and the related ELISA assay as tools to track insect movement in ecological studies. Buczkowski also served as project leader in a pilot study in Stellenbosch on a collaborative field study to develop and test low-toxicity baits to control Argentine ants in commercial orchards/vineyards. This project was sponsored by Syngenta Crop Protection.

C. Richard Edwards traveled in July 2012 to the region in Italy known as Orzinuovi, Brescia province, to organize a corn field day and lecture to approximately 50 farmers and 25 industry people. His talk was titled “Factors to consider in the management of maize insect pests in Brescia province,” and the field activity was patterned after crop field days organized and carried out by Purdue Extension specialists. He then went to the Lleida, Catalonia, region of Spain to give two lectures and conduct in-field pest management training on corn insect pests to 32 MS graduate students at the University of Lleida. Lectures included identification techniques, pest monitoring, development and use of economic thresholds, and pest controls for selected corn insect pests, including information on management of corn insects using transgenics.

Rick Foster had another activity-filled academic year, which included hosting a visiting scholar from Afghanistan and supervising an Afghan PhD student and another Afghan visiting scientist. Related to his projects in Afghanistan, he was inducted into the COA Millionaire’s Club for a USDA SPS grant. He also developed training programs for insect diagnostics activities in Afghanistan. During this same period, Foster supervised an MS student from Central America; hosted two undergraduate summer interns from Honduras in 2012 and one in 2013; and traveled to Ecuador for IPM CRSP planning meetings.

Ameya Gondhalekar co-mentored visiting scientists from India and China. Both were working on research projects on the basic biology and management of German cockroaches.

Christian Krupke was invited in November of 2012 to travel to Venice, Italy, as an invited speaker/presenter at the Task Force for Systemic Pesticides working group. He presented lab research to a multinational working group of approximately 30 individuals, broadly focused upon

systemic insecticides and their fates in the environment. Expertise areas included toxicology, apiculture, pest management, human health, and environmental fate. He also initiated a draft of a white paper to review the current state of knowledge in this area, to be published late in 2013 or early in 2014.

Larry Murdock completed and published the book *Cowpea for Africa* in July 2012. It details the merits of the crop for Africa and highlights the needs and opportunities for its improvement to help feed poor farmers and consumers across the continent. Murdock organized an August 2012 meeting in Leopold, Indiana, for members of the Bt-Cowpea Project Advisory Committee and others. They reviewed progress, identified outstanding needs, overcame obstacles and identified new funding for the project, which had its origins at Purdue in 1987 and which Purdue scientists continue to help steer.

In October, Murdock traveled to Burkina Faso to receive the Orde d’Merite National with the rank of Chevalier (National Order of Merit with the rank of Knight) of Burkina Faso for his role in inventing and developing PICS bags for cowpea storage by low-resource farmers and consumers in the developing nations of Africa.

Cliff Sadof co-directed the research of two graduate students at Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) in San Jose, Costa Rica, which provided justification for changing USDA APHIS regulations governing exports of *Dracaena marginata* plants to the United States. Growers of this crop are now able to export plants up to 55 inches in length, enabling a higher quality of plant to be available for U.S. consumers. Ornamental crops contribute 85 million dollars per year to the Costa Rican economy.

Jeff Stuart participated in Reunion Grupo de Trabajo Proyecto Plan de Impacto-Fulbright a Fulbright-led effort to encourage Colombian students who have graduated outside of the country to return to work in Colombia.

Steve Yaninek continued his collaborative pest management research with counterparts and students at Eldoret University in Kenya as part of a USAID Horticulture CRSP project on Indigenous African Leafy Vegetables in Kenya, Tanzania, and Zambia. Preliminary field trial results were collected throughout the year as part of student thesis research and presented at the International Horticultural CRSP Annual Conference in Nairobi, Kenya, in May 2013.

In August 2012, he traveled to the International Conference of Entomology in Daegu, South Korea, as part of the U.S. delegation, which successfully bid to host the 2016 meeting in Orlando, Florida. Then in April 2013, he was invited as an external examiner at a thesis defense at Minia University in Minia, Egypt.

Jennifer Zaspel traveled to Thailand, to the Chiang Mai Province for fieldwork and collections-based research. Blood and lichen-feeding moth specimens were collected for future morphological and molecular analysis. Specimens were also acquired as a part of ongoing efforts to expand insect diversity/holdings in the Purdue Entomological Research Collection (PERC).

Food Science

Center for Food Safety Engineering, directed by **Lisa Mauer**, hosted the annual meeting of the China MOST-USDA Joint Research Center for Food Safety at Purdue in November 2012.

International Food Technology Center (IFTC) continued its engagements in food processing technologies in African countries including Mali, Senegal, and Niger. The center obtained a grant from the World Initiative for Soy in Human Health (WISHH)/Indiana Soybean Alliance (ISA) to test and optimize the use of the small-scale extruder built by Technochem International Inc., (Boone, IA), for development of soy-based food products in Africa. The work was led by Martin Okos, professor, Department of Agricultural and Biological Engineering and Department of Chemical Engineering. The extruder was reassembled and tested for use in making Senegalese staple foods. Redesign recommendations have been shared with the manufacturer for further improvement.

The center obtained a grant from USAID/Economic Research Service (ERS) for development and assessment of a fortified instant cereal produce for the Senegalese market. This is a three-year (2013–2015) project led by **Mario Ferruzzi**. It also includes a component on capacity for a Senegalese graduate student. IFTC also worked to keep policymakers informed on the role of food technology in food security by hosting a meeting on the topic in Washington, D.C., on September 6, 2012. The symposium entitled Farm to Fork: the Role of Food Processing in Reducing Losses and Creating Markets for Smallholder Farmers in Africa was hosted in collaboration with University of Georgia and the Partnership to Cut Hunger and Poverty in Africa (an advocacy group based in Washington, D.C.).

Bruce Applegate, along with several other Purdue faculty members, led a group of students in a service-learning course to the Dominican Republic in March 2013 to develop a water-treatment system for the entire community of La Torre.

In August 2012, **Arun Bhunia** was an invited speaker to deliver talks on biosensor-based technologies for foodborne pathogen detection at the 16th World Congress of Food Science and Technology (IUFoST) held in Foz do Iguacu, Brazil. He also visited and presented seminars at University of Pelotas (UFPel), Brazil, and University of Brescia, Italy, in March 2013.

Betty Bugusu, Managing Director of IFTC, participated in a panel discussion on the subject of food waste and loss at a plenary session of 2012 World Food Prize symposium in Des Moines, Iowa, on October 19, 2012. She and **Suzanne Nielsen** gave a talk on the “Role of food science in food security” at the Science Center of Iowa & Blank IMAX® Dome Theater on Oct. 17, 2012.

Bugusu also gave talks in the following forums: The 16th IUFoST World Congress of Food Science and Technology held in Foz do Iguacu, Parana, Brazil, August 2012, presentation titled “Role of Food Science and Technology in Post-harvest Loss Reduction,” and a Purdue University TED conference (TEDxPurdueU) presentation titled “Waste Not, Want Not: A Weapon for Food Security.”

Christian Butzke explored Northern China in October 2012 to check the status of a winery project his team initiated in 2006. With hundreds of acres of vineyards around the ancient Great Wall and an ultra-modern winery now in full production, the Chinese-American joint venture is set to become one of the leading winemaking operations in all of China. On his way, he stopped by China Agricultural University in Beijing to visit with former Purdue Food Science visiting scholar, Yunbo Luo, the Dean of the College of Food Science and Nutritional Engineering.

In May 2013, **Mario Ferruzzi** visited with Conserve Italia to discuss research findings on processing of high value fruits and vegetables (collaborative project with **Andrea Liceaga** and **Fernanda San**

Martin). He presented invited lectures on carotenoid and polyphenol bioavailability and health at the University of Pretoria, South Africa, Nutrition Research Symposium in May 2013. In March 2013, Ferruzzi and Liceaga co-led a study-abroad course to Italy called Food and Agriculture in Italy.

Kevin Keener’s research team participated in the technology presentation “Atmospheric Cold Plasma Treatment of Fresh Fruits and Vegetables for Improved Food Safety” at the International Food Research and Development Brokerage Event in Izmir, Turkey, on June 3–4, 2013, and was awarded fourth place (honorable mention) out of 167 participants. Keener participated in the ANECA (Mexican National Association of Poultry Specialists) 9th Annual Technical Symposium on Poultry Processing in March 2013, in the city of Querétaro, México, and gave technical presentations on egg safety and egg processing technologies.

Kee-Hong Kim was invited to present at the annual meeting of the Korean Society of Food Science and Nutrition, Jeju Island, Korea. Kim joined the Department of Food and Nutrition, Yonsei University, Seoul, Korea, and the Department of Food Bioscience, Korea University, Seoul, Korea, as an adjunct faculty member. Kim continues research collaboration with Korean Food Research Institute (KFRI) and is PI on a KFRI-funded project. Kim was invited to join the program organizing committee of the International Conference on Food Factors, 2015.

Amy Hui-Mei Lin was invited to lecture at Guelph Food Research Centre at the Agriculture and Agri-Food Canada, 10th International Conference of Food Science and Technology (ICFST) at Jiangnan University (Wuxi, Chian), Nanchang University (Nanchang, China), National Taiwan University (Taipei, Taiwan), and National Pintung University (Pintung, Taiwan). Lin also lectured at the 4th World Congress of Pediatric Gastroenterology, Hepatology and Nutrition (WCPGHAN 2012) in Taipei, Taiwan. Lin was invited to serve as a committee member of a PhD defense at Guelph University (Ontario, Canada). Lin is involved in international research collaborations with D. Rose and M. Pinto in Canada, R. Quezada-Calvillo in Mexico, H. Naim in Germany, and M. Gidley in Australia.

Haley Oliver traveled to Kabul, Afghanistan, in November 2012 to continue the Afghanistan Sanitary/Phytosanitary Project awarded to Purdue University/IPIA by the USDA Foreign Agriculture Service in September 2011. Food Safety training for personnel in the Ministry of Agriculture, Livestock, and Irrigation (MAIL) is one of the major focuses of this capacity-building grant. Oliver and Kendra Nightingale of Texas Tech University delivered food safety training workshops in June and November 2012 to Afghan government employees and food industry leaders. The workshops focused on basic sanitation, good agriculture practices, and good manufacturing practices. In December 2012, the second year of the Animals and Food Security Service Learning–Haiti course was offered jointly by Oliver and Mark Russell (Animal Sciences). A total of 18 students were enrolled in the class that convened in the fall prior to traveling to northern Haiti over winter break. Students learned the principles of extension methodology, sustainable development, and how to effectively work with local community leaders. This course is a model service-learning experience that introduced Purdue students to local students and residents in Cap-Haitien, Haiti. The third class of students traveled to Haiti over winter break 2013.

Forestry and Natural Resources

Paul Brown served as Associate Editor for the *Journal of the Ocean University of China*.

Andrew DeWoody was appointed as a member of Safari Club International's Conservation Committee and Chair of the Conservation Grants Subcommittee and of the 2013 zipTrips presentation, "It's a Gene Thing" (125 schools, >5000 students). He also gave two presentations at the 1st Joint Congress on Evolutionary Biology in Ottawa, Canada, in July 2012.

Jeffrey Dukes gave three invited presentations on the changing global environment in Kioloa, Australia; Rome, Italy; and Agra, India. He also gave a contributed presentation in Obergurgl, Austria. Dukes was the co-lead organizer of the Joint CLIMMANI/ INTERFACE meeting in Mikulov, Czech Republic. He was on the organizing committee and served as session leader for the Open Science Conference on Climate Extremes and Biogeochemical Cycles in the Terrestrial Biosphere: Impacts and Feedbacks Across Species held in Tirol, Austria. Dukes served as a co-convenor, GB1.6: Climate extremes, ecosystems and biogeochemical cycles at the European Geosciences Union General Assembly in Vienna, Austria. He was the co-leader of the oral session on Experimental Manipulations of Ecosystems at the BIOGEMON 2012: The 7th International Symposium on Ecosystem Behavior held in Northport, Maine, in 2012. Dukes serves on the Advisory Board of the European Union's "INCREASE" project (An Integrated Network on Climate Research Activities on Shrubland Ecosystems).

Barny Dunning traveled to the Pacific Northwest (northern California, Oregon, and Washington) in July 2012 with 33 undergraduate students participating in the department's summer course in international natural resource issues. This course is taught with two partner institutions: North Carolina State University (NCSU) and the Swedish University of Agricultural Sciences (SLU). Undergraduate participants in 2012 included 16 students from Sweden in addition to ten from Purdue and six from NCSU. Faculty participating in the course included four SLU professors from the Department of Soil and the Environment and the School of Forest Management (both of which are components of SLU). Topics included forestry, wildlife, outdoor recreation, water and energy resources, urban sustainability and marine/coastal resources. Students interacted with researchers, resource managers, and representatives from city, state, federal, and Native American jurisdictions.

Songlin Fei served as a reviewer for the European Commission AgreeSkills Programme. Fei supervised one international MS student and one international postdoc. Fei published three papers with researchers from Peking University, Beijing Forestry University, and Beijing Agricultural University, China.

Reuben Goforth traveled to Costa Rica in March 2013 with 13 undergraduate students for his tropical biology practicum. They stayed at La Tirimbina Bioserve and La Selva during their stay and saw probably the greatest number of species encompassing several taxonomic groups that they had seen to date. They made day trips to Cahuita on the Caribbean coast and Vulcan Arenal, which was until recently one of the most active volcanoes in the world.

Eva Haviarova presented a paper at IUFRO Division 5 Conference, Estoril, Portugal, "LCA Supported Sustainable Product Development for Furniture Industry." She also delivered an invited presentation at the Annual Meeting, Society of Wood Science and Technology in Beijing, China: "Wood, the Most Interesting, Innovative and the Best Material for Our Society."

Eva Haviarova and **Rado Gazo**, in cooperation with Quesada-Pineda, conducted a half-day workshop in Zapote, Costa Rica, (March 2013, 75 participants). The title of the workshop was Sustainability and Innovation in the Wood Products Industry. Haviarova and Gazo also conducted a study-abroad program in Costa Rica from March 10–18, 2013 (Sustainability Issues in Central America, 2013). Students had the opportunity to learn the theoretical aspects of sustainability in the classrooms through lectures from local researchers during the first two days, and then visited national parks, research stations, local universities, cultural sites, industry sites, and diverse geographic locations.

Haviarova and **Carl A. Eckelman** continued ongoing research collaboration with Mugla University, Turkey. Three articles, based on this collaboration, were printed within the last year in *Wood and Fiber Science*.

Jason Hoverman attended the World Congress of Herpetology in Vancouver, Canada, in August 2012. He was invited to give a talk in an amphibian disease symposium. The title was "Beyond single pathogens: significance of co-infections and pathogen communities for amphibian conservation." Hoverman also presented at Phenotypic Plasticity—Variation, Alteration and Speciation in Lund, Sweden, in November 2012. The title was "Generalist versus specialist anti-predator strategies among closely related gastropod prey."

Douglass Jacobs was invited to attend Toward Development of Silvical Strategies for Forest Restoration of American Chestnut (*Castanea dentata*)" at the 2nd Forest Science Forum, Beijing, China, 2012. He was also invited to attend Bases ecofisiológicas del establecimiento de las plantas en ambientes mediterráneos, a symposium on urban and peri-urban forestry held at Pontificia Universidad Católica de Chile, Santiago, Chile, 2012. Jacobs was invited to teach the following international courses: 1) "Bases ecofisiológicas para la producción de plantas de calidad en vivero para mejorar el establecimiento de plantaciones forestales," 30 students from Chile, Universidad Austral de Chile, Valdivia, Chile, 2013; and 2) "Forest Restoration in Theory and Practice," 17 students from Denmark, Estonia, Finland, Norway, and Sweden, at Swedish Agricultural University, Frostavallen, Sweden, 2013.

Jacobs supervised the following international staff: Safiullah Khurram (MS) Afghanistan; Arjan de Bruijn (postdoc), Netherlands; Barbara Mariotti (visiting scientist) University of Florence, Italy; Mercedes Uscola (visiting scientist) University of Alcalá, Spain.

He also co-organized Nutrient Dynamics of Planted Forests (International Union of Forest Research Organizations International Research Symposium, 2012) in Vancouver, Washington.

Charles Michler chaired a research proposal review panel for Portugal (FCT) in the area of Agriculture and Natural Resources in November 2012. He made a site visit to Sinar Mas, Inc., in Indonesia at the request of IPIA to evaluate research opportunities pertaining to pulpwood production at the company (December 2012).

Bryan Pijanowski was a member of a Chilean National Research Council panel that evaluated over 50 proposals for national climate change centers. Pijanowski was also an invited speaker at four international workshops/conferences: (1) the EU COST Urban Soundscapes workshop in Merona, Italy, in March of 2013; (2) a Brazilian workshop on remote sensing applications for agriculture and forestry in March of 2013; (3) a workshop on monitoring for biodiversity at the Zoological Society of London in May of 2013; and, (4) a Coupled-Natural Human Systems conference in Nanjing, China, in June 2013 that brought together scientists

from China and the United States to begin partnerships between these two countries. Pijanowski also held meetings with prominent researchers from his Global Sustainable Soundscape Network: David Monacchi from Urbino, Italy, and Jerome Sueur from the National Museum of Natural History in Paris, France. He published several papers on his international work in East Africa (regional food security and climate change) and in Costa Rica (soundscapes and lidar work at La Selva Biological Station). One paper was published (*Diversity and Distributions*) on global patterns of mammal species richness as influenced by land-use patterns. During the past year he hosted a visiting scholar, Wei Song, from the Chinese Academy of Sciences' Institute of Geography and Land Use Planning. Through his work on soundscapes, he has started collaborations with scholars in Ireland, Russia, Italy, England, Serbia, Ukraine, India, Australia, and Brazil, and he has granted interviews to the media in Australia (ANPR), and the United Kingdom (*The Economist* and the *Ecologist*).

Paula Pijut co-presented (with Micah Stevens) their research at the VII International Walnut Symposium in Fenyang City of Shanxi, China. She continued as an associate editor for *Plant Cell Tissue and Organ Culture: Journal of Plant Biotechnology* (The Netherlands); an editorial board member for *Propagation of Ornamental Plants* (Sofia, Bulgaria); and an associate editor for the *International Association for Plant Biotechnology-In Vitro Cellular and Developmental Biology-Plant* (New York; Germany). Pijut continued as a research advisor for Trees for Tanzania (Kigoma, Tanzania) and was a member of the biotechnology faculty, Columbia-Purdue Institute for Advanced Scientific Research (<https://engineering.purdue.edu/CPIASR>). She also supervised two PhD students: one from China and one from South Korea.

Linda Prokopy hosted Rabindra Padaria, principal scientist at Division of Agricultural Extension, Indian Agricultural Research Institute, in November 2012. Prokopy was an invited speaker at Climate-Smart Agriculture Global Science Conference in Davis, California. The conference was jointly sponsored by the World Bank and the University of California-Davis, and included participants from 37 countries in March 2013. Her presentation title was “Barriers to Adoption of Climate Smart Agriculture Practices in the Midwestern United States.”

Mike Saunders organized an international conference, North American Forest Ecology Workshop that was attended by individuals from Mexico, Canada, and Saudi Arabia in June 2013. He was invited to serve as associate editor for special issue of *International Journal of Tropical Research*—“Silviculture of Valuable Tropical Timber Species Growing in Mixed Natural Forests.”

Marisol Sepúlveda served as the major advisor for several international students: two from China, one from Peru and one from Egypt.

Guofan Shao was invited to present at the Unmanned Aerial Vehicle (UAV) Remote Sensing workshop in Sao Carlos, Brazil, in April 2013. He was also invited to present at the International Workshop on East Asian and European Regional Environmental Governance (EE-REG) in Kyoto, Japan, in January 2013. He was appointed as an Overseas Expert by the Chinese Academy of Sciences in June 2013. He continues as an associate editor for the *International Journal of Sustainable Development and World Ecology*. Shao also supervised an international PhD student from China.

Rod Williams hosted a Chinese visiting scholar from February through March 2012. He also presented at the World Congress of Herpetology in Vancouver, British Columbia.

Keith Woeste served as “outgoing host” (mentor) of an EU-funded, post-doctoral fellow who will be working in the Department of Forestry and Natural Resources for two years. Her work here is part of an ongoing collaboration with scientists at CNR-IBAF, Porano, Umbria, Italy. Woeste published one paper and submitted another based on collaboration with colleagues from Northwest Agriculture and Forestry University, Shaanxi, China.

Hao Zhang presented invited talks at the Forum on Strategies to Cope with Natural Disasters, held in Beijing, China, in June 2013 and at the 8th Conference on Extreme Value Analysis, held in Shanghai, China, in July 2013.

Pat Zollner submitted one manuscript for publication in the journal *Oryx* with collaborator Jean Bosco Kpanou from World Wildlife Fund B.P. 1053, Bangui, Central African Republic.

Horticulture and Landscape Architecture

Mike Dana and **Rosie Lerner**, former Master Gardener state coordinator, led a twelve-day Master Gardener study tour of the Renaissance Gardens of Italy in June 2013. Master Gardeners from Indiana and eight other states received advanced training by studying and experiencing fifteen historic landscapes in Tuscany and near Rome.

Brian Dilkes taught a course on Doubled Haploid Production at CIMMYT, the International Maize and Wheat Improvement Center in Mexico. Dilkes' lab postdoc, Charles Addo-Quaye, taught a course in bioinformatics at the West African Center for Crop Improvement in Ghana as part of a Bill and Melinda Gates Foundation project.

Natalia Dudareva served as a member of the Scientific Advisory Board for a Center of Excellence on Plant Sciences (CEPLAS), Heinrich-Heine-University, Dusseldorf, Germany, May 2013 and on the EuroVOL review panel at European Science Foundation for midterm grant evaluation, Florence, Italy, April 2013. She gave several invited talks, including talks at the 2013 International Symposium and Annual Meeting of the Korean Society for Applied Biological Chemistry, Busan, Korea, June 2013; at Terpnet2013, Kolymvari, Crete, Greece, June 2013; and at CEPLAS (Cluster of Excellence on Plant Science) Meeting, Dusseldorf, Germany, May 2013. She also gave invited seminars at the Institute of Biological and Environmental Sciences, Aberdeen University, Scotland (sponsored by The Centre for Genome-Enabled Biology and Medicine), April 2013; at the Department of Molecular Biotechnology, Bioenergy Research Center, Chonnam National University, Gwangju, South Korea, June 2013; at the Advanced Radiation Technology Institute (ARTI)/Research Division for Biotechnology, Korea Atomic Energy Research Institute (KAERI), Jeollabuk-do, South Korea, June 2013; and at the Department of Biochemistry, Gyeongsang National University, Gyeongsangnam-do, South Korea, June 2013.

Bao Yang from South China Botanical Garden, Chinese Academy of Sciences, Guangzhou, received a fellowship from the Chinese Academy of Sciences and visited Dudareva's laboratory from April 6, 2012, through April 5, 2013.

Avtar Handa delivered several invited lectures at conferences and institutions around the world. Handa spoke at a special symposium organized by the Department of Biological Sciences at Tata Institute of Fundamental Research, Mumbai, India August 2012 on “Spermidine, an elixir for longevity.” He also presented at the 7th International Postharvest Symposium, July 2012, in Kuala Lumpur, Malaysia, on “Antioxidants, bio reactive compounds and health promoting substances”; and at the International Conference on Plant Biotechnology for Food Security: New Frontiers held at National Agriculture Research Center, in New Delhi, India, January 2013 on “Incorporating desirable quality traits in fruit crops via biotechnology interventions.”

During 2012–2013 Handa mentored several scientists/students from Pakistan, India, Benin, and Egypt. Handa was a co-major professor for EZIN Ishola Awe Vincent who received his PhD in 2013 from University of Abomey-Calavi, Benin, Africa. Handa is presently co-advisor of two PhD students from Egypt. Additionally, Handa provided advanced training to two visiting scholars from The Punjab University, Lahore, and the National Center on Plant Biotechnology, New Delhi.

Peter Hirst increased his collaboration with Northwest Agriculture and Forestry University (NWAUFU) in Shaanxi province, China. He was granted guest professor status, hosted two visiting scientists (Huike Li and Yizhen Wan) and visited NWAUFU in July. He also met with a delegation from NWAUFU including the president and deans in April. Hirst’s main collaborator at NWAUFU is Mingyu Han, chief scientist for apples in China.

Hirst hosted two visiting faculty members from Afghanistan in the fall of 2012, Sadat and Najibullah. He is also the supervisor for a visiting student from Afghanistan, Khalil Jahed. Hirst participated in two training programs for U.S. National Guard troops, prior to deployment to Afghanistan. Topics were orchard-tree management and grafting.

Jules Janick traveled to Italy and France in September 2012 to inspect Purdue apple selections being grown and to collaborate with nurseries with Purdue Research Foundation contracts. ‘CrimsonCrisp’ and ‘Pixie Crunch’ apples looked outstanding and are being planted in Italy and France. Arrangements were made to have elite selections tested in both countries under a cooperative agreement. In October, 2012 Janick was invited as keynote speaker at the XXII Congress on Brazilian Fruit Culture in Bento Goncalves. In April 2013, presentations were made in an apple field day of Chile’s Agricultural Research Institute (INIA) in Chillan, Chile, and a lecture was presented on fruit breeding in a “Seminar on Apple Improvement” in Santiago. Open-pollinated seed from Purdue scab-resistant selections are being grown by INIA to provide advanced germplasm for their apple-breeding program.

Mike Mickelbart spent five weeks at Universidad Icesi in Cali, Colombia, as a Fulbright Visiting Scientist Fellow, primarily to assist Professor Thaura Ghneim in revising the university’s plant physiology course. While there, Mickelbart presented several lectures to undergraduates and presented a seminar to faculty entitled “Stomatal development and its role in water use efficiency in plants.” He visited the International Center for Tropical Agriculture (CIAT), where he met with scientists at the center and presented a seminar entitled “Regulation of water loss for improvement of crop water use efficiency.”

Mickelbart organized summer internships for five students from Icesi. The students worked in the labs of **Mike Hasegawa**, Jo Ann Banks (Botany and Plant Pathology), Jeff Stuart (Entomology), and Mickelbart. The students were supported from a combination of funds from Purdue, Icesi, and several donors in Colombia. The students each worked on individual projects and presented their findings at a poster session in the last week of their visit.

Cary Mitchell was keynote speaker at two international conferences. The first presentation was “LEDs in Plant Science,” which was given at Downing College in Cambridge, England, on September 10, 2012. The second was entitled “Plant Lighting in Controlled Environments for Space and Earth Applications,” which was presented October 15, 2012 at the LightSym2012 International symposium at Wageningen University in the Netherlands.

K. Raghothama attended 8th International Plant Soil Interactions in Low pH (PSILPH) in Bangalore, India, as a member of international steering committee. He chaired a conference session and assisted in program organization. Raghothama visited Federal University of Vicosa (UFV) in Brazil to plan for Purdue Day at Vicosa (October 2013) and explore collaborative research and educational opportunities for the College of Agriculture.

Jian-Kang Zhu served as the co-organizer for the Cold Spring Harbor Asia Conference, Plant Epigenetics, Stress and Evolution held in Suzhou Dushu Lake Conference Center held October 2012. During 2012–2013, six visitors joined his lab: Lu Xing, a doctoral student from the University of Science and Technology of China funded by the China Scholarship Council; Wenfeng Nie, a doctoral student from Zhejiang University in China funded by the China Scholarship Council; Wenshan Liu, a doctoral student from the Institute of Plant Physiology and Ecology in Shanghai, China, funded by the China Scholarship Council; Satendra Kumar, a scientist in Directorate of Rice Research in India funded by the Indo-U.S. Science and Technology Forum (IUSSTF); Guohui Zhu, a professor from South China Agricultural University in Guangzhou, China, funded by the China Scholarship Council; and Yuqi Guo, a professor from Zhengzhou University of China, funded by the China Scholarship Council.

Youth Development and Agricultural Education

Colleen Brady attended the International Society for Equitation Science Conference in July with graduate student Melissa Voigt presenting. She also took 22 students on a study-abroad experience about the equine industry to Ireland, England, and Wales. Post-course evaluation of motivation to participate and skill acquisition, was presented at the Equine Science Society and Animal Science Society national meetings, respectively.

In 2012, **Jerry Peters** traveled to Herat, Afghanistan, to assist with a workshop on Curriculum Standardization and Syllabus Development for the College of Agriculture faculty and staff at Herat University. On September 27, 2012, he presented a workshop on Working with Adults/ Extension Education, which was presented to the Indiana National Guard Agriculture Development Team preparing to be deployed to Afghanistan. In January 2013 he traveled to Faisalabad, Pakistan, for continuation of the USDA-funded Af-Pak initiative on Strengthening Extension Skills of Young Professionals in Afghanistan and Pakistan. In late January and early February he presented pedagogical and leadership workshops for the Afghan Junior Faculty Development Program, a project of the Bureau of

Educational and Cultural Affairs (ECA), U.S. Department of State. In March, he traveled to Conakry and Mamou, Guinea, as a volunteer associated with Winrock International. While in Guinea, he provided a workshop and technical assistance to the faculty/staff of Ecoles Nationale D'agriculture Et D'elevage (ENAE) at Mamou, Guinea.

In June, **Abigail Borron** traveled to Romania to cultivate collaborative partnerships with Heifer Romania staff, as well as with the faculty from the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca (USAMV). The purpose of the partnership is to develop a service-learning program for undergraduate students in the agricultural communication program at Purdue. While with Romanian families, students would develop promotional and informational materials, would conduct basic social science research in cultural understanding and engagement, and would be tasked with testing milk quality among the beneficiaries. This service-learning program is proposed for the 2014 Maymester (May 19–June 2).

Allen Talbert led a group of six Purdue agricultural education students on a Maymester study-abroad program in Jamaica.

Roger Tormoehlen and several youth educators in Extension Areas II (south central Indiana) and XI (northeast Indiana) organized, in partnership with our 4-H and governmental colleagues in Poland, a two-week cultural exchange of 28 Polish youth and adults to Indiana. The Area II county youth educators hosted six youth and two adults associated with the Polish Extension system and Polish 4-H program in the Opolskie voivodship (province). Fourteen 4-H youth and six adults (governmental and Extension officials) from the Swietokrzyskie voivodship were hosted by northern Indiana 4-H families.

Jerry Peters, Allen Talbert, and Roger Tormoehlen served as the major professors for three Malawian graduate students during the 2012–13 academic year. The students completed their coursework, and designed and began work on their research projects, which will be conducted in Malawi during the 2013–14 academic year.

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