



IPIA

# Annual Highlights 2011–2012

# International Programs in Agriculture

## Message from the Director

In the Purdue College of Agriculture (CoA) we often ask ourselves what it takes to make a real difference in the world? We ask ourselves the question that I often hear at the Bill & Melinda Gates Foundation, “How many million people will benefit?”

In this issue of *Highlights* you will read about our attempts to make a difference. For example, the Purdue Improved Crop Storage (PICS) project is reaching millions of farmers in Africa with better grain storage technology. In Afghanistan Purdue faculty and staff are helping to rebuild agricultural education, research and extension capacity, which directly serves the almost 80% of the Afghan population of 30 million that is engaged in agriculture.

Purdue CoA study abroad involves 200 to 300 students each year, but the impact of study abroad is much broader. Study abroad is often a life-changing experience. Students who study abroad go on to be leaders in research, education, and business. Through their lifetimes they touch the lives of millions of people.

The impact of Purdue CoA international activities depends on good partners. PICS works with national extension services, nongovernmental organizations (NGOs), and other organizations throughout Africa. In Afghanistan, Purdue faculty and staff depend on close working relationships with universities, the Ministry of Agriculture, and the Ministry of Higher Education. I hope that some of those who read *Highlights* are motivated to become Purdue CoA international partners. It is a relationship that has benefits on all sides.

The *2011–2012 Highlights* is a brief summary of international programs in agriculture activity over the past year. If you are a member of the Purdue Agriculture community, a long time collaborator, or a new partner, we hope that next year your activities will be outlined in the *Highlights*. Please contact us or the departments if you have any questions or comments about CoA international activities.

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

## STUDY ABROAD

In 2011–12, over 28 percent of our graduating undergraduates studied abroad prior to graduation—still the highest percentage of any college or school at Purdue. We also welcomed 25 international exchange students from our partner universities. Why are we so successful? It’s a combination of continual innovation and support.

We offered three new courses: a winter break service-learning course in Haiti in cooperation with Heifer International; a tropical biology practicum where students conducted hands-on research in Costa Rica; and a food experience focused on production, preparation, and marketing in Italy. Also, we completed an exchange agreement with the Universidad de São Paulo at Pirassununga.

In September we held the first Annual College of Agriculture Study Abroad Fair. Faculty and students who had previously participated were on hand to discuss and promote the courses and programs offered.

Our generous supporters funded scholarships and grants totaling \$19,500 that made study abroad possible for agriculture students who participated in long-term programs (eight weeks or longer).

This year our International Agriculture Ambassadors talked with students in the classroom, helped with visitors to IPIA, and hosted a booth at Spring Fest. Ambassadors for 2011–12 were:

Thomas Atchley—Agricultural Economics  
Ashtin Balzer—Agricultural Education  
Katie Clemons—Animal Sciences  
Colleen Hartel—Wildlife  
Betheny Moore—Biochemistry  
Patricia Peng—Natural Resources and  
Environmental Science  
Joshua Price—Agricultural Economics  
Shalyse Tindell—Animal Science  
Alexis Zobel—Biochemistry

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OFFICE CONTACTS

### INTERNATIONAL EXTENSION

Seven Purdue Extension educators and International Extension Program Coordinator Jim Murren worked abroad in 2012. They facilitated a second year of USAID Farmer to Farmer workshops in Turrialba, Costa Rica, with a small organic farmer's association. Building on the previous year's efforts, they helped create a business plan for the association and carry out organizational capacity-building trainings. George Okantey traveled to South Africa on a Farmer to Farmer project and helped table grape growers develop organizational leadership skills. Through a new project linking an Ethiopian community center in Indianapolis to an orphanage in Addis Ababa, Extension also provided technical assistance for gardening, dairy, and product marketing activities. To learn more about International Extension, go to: <https://ag.purdue.edu/ipia/Pages/extension.aspx>.

### REGIONAL INTERNATIONAL PARTNERSHIP EFFORTS: Latin America

Efforts to reinvigorate Purdue Agriculture's Latin American activities continued most notably in Brazil and Colombia. Jess Lowenberg-DeBoer and Jeff Stuart visited scientists and administrators at the Federal University of Viçosa in Brazil (UFV). This visit was made as part of the effort to build on the long-standing partnership between UFV and Purdue Agriculture. The goals were to improve the potential for student exchanges and collaborative research and to determine how Purdue Agriculture may more effectively participate in Brazil's Science Without Borders program. Several activities with Colombia grew out of Purdue Agriculture's association with the Colombian-Purdue Initiative for Advanced Scientific Research (CPIASR), initiated by Arvind Raman and Jean Paul Allain in the College of Engineering and Morris Levy in the College of Science.

Dean Jay Akridge joined Arden Bement (Director, Global Policy Research Institute), Richard Cosier (Avrum and Joyce Gray Director of the *Burton D. Morgan Center for Entrepreneurship*), and Purdue alum Juan Ernesto Bedout (former group president of Latin American operations for Kimberly-Clark) in Bogotá, where they attended the conference "Connecting Colombia: Innovation-Based Development." Dean Akridge showcased Purdue Agriculture and met with the rectors of several Colombian universities, the directors of Colombian research and funding agencies, the Colombian Minister of Education, and the Director General of CIAT. The Colombian President, Juan Manuel Santos Calderón, also addressed the meeting. This interaction resulted in a visit to Purdue by the Chamber of Commerce of the State of Barranquia Colombia and will develop further as a result of an invited talk by Marshall Martin in Barranquia, September 2012. In October, CPIASR organized a symposium at Purdue that brought scientists and administrators

from over 20 Colombian universities to develop collaborations with faculty/staff at Purdue in both research and education. Personal relationships between Purdue and Colombian investigators will continue to grow as several Purdue Agriculture scientists continue to visit Colombian institutions.

### INTERDISCIPLINARY INTERNATIONAL EFFORTS

#### Advancing Afghan Agriculture Alliance (A4) and Other Related Activities

[www.purdue.edu/afghanistan](http://www.purdue.edu/afghanistan)

Purdue Agriculture continued its extensive involvement in building capacity in Afghanistan, with activities targeting the Ministry of Agriculture, Irrigation, and Livestock (MAIL) and the Ministry of Higher Education (MoHE). Several new projects in Afghanistan were launched, including the USAID-funded Strengthening Afghanistan Agricultural Faculties (SAAF) project, which works to develop agricultural education at five universities in Afghanistan; the USDA-funded Afghanistan Sanitary/Phytosanitary Project (SPS), which leads trainings in food safety, plant disease diagnostics, pest identification, and animal health to MAIL and Ministry of Public Health (MoPH) staff members; and the USDA-funded Afghanistan Agricultural Extension Project (AAEP), which features four land-grant universities, including Purdue, working to build the capacity of the extension services offered in select provinces in Afghanistan. We have continued our training sessions for National Guard Agribusiness Development Team units (ADT) before their deployment to Afghanistan. We have also participated in Strengthening Extension Skills of Young Professionals in Afghanistan and Pakistan (AfPak), which seeks to strengthen technical skills, as well as promote professional ties among Afghan and Pakistani extension agents.

In addition, we hosted 14 Afghan visiting scholars (including five female faculty members) from various Afghan universities under the Afghanistan Junior Faculty Development Project (AJFDP) administered by the Institute of International Education. We also had two agricultural faculty members from Kandahar and Nangarhar Universities under the Norman E. Borlaug Fellowship Program. Along with this, 20 agricultural faculty members from SAAF institutions have begun studying for their master's degrees under the SAAF project. Eight were selected for study in the United States while 12 were selected to attend consortium institutions in India.

#### USDA/FAS Borlaug Fellowships

IPIA staff helped match international Borlaug Fellowship opportunities with Purdue faculty expertise. Purdue was selected to train three Borlaug Fellows: Sujay Rakshit and Vanda Rai from India, and Sri Yuliani from Indonesia. IPIA staff member Lonni Kucik

served as Training Coordinator, and Guri Johal (Botany), Gebisa Ejeta (Agronomy), Mike Mickelbart (Horticulture and Landscape Architecture), Mike Hasegawa (Horticulture and Landscape Architecture), and Fernanda San Martin Gonzalez (Food Science) served as mentors or co-mentors.

### 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. The FPI agriculture programs work with resource-poor smallholder farmer AMPATH clients in western Kenya. These activities develop improved agronomic practices for clients and disseminated best management production, harvesting and handling practices that promote environmentally sound agricultural production.

In the past year, Obura engaged in capacity building of FPI's agricultural extension staff and interacted directly with smallholder farmers in western Kenya in maize, bean, vegetable, fruit, and animal production practices and emphasized sustainable soil management practices. Her activities included activities related to the Horticulture CRSP program on market chain aspects of African Indigenous Vegetables (AIVs) and their potential for promoting farm diversification and improving income and food security of AMPATH client farmers and their families.

Weller (HLA) and Darrell Schulze (Agronomy) collaborated on sending four Purdue students to Kenya for a 10-week summer internship experience where they worked directly with Obura on FPI activities. Schulze coordinated the internship program. Student activities included production and market assessments for AIVs, development of production and extension training modules and technical advice on the establishment of biomass briquette production practices, surveys of farmer irrigation and/or watering techniques for vegetables, and development of a digital soil map of the Uasin Gishu Plateau in western Kenya to provide more detail of soil resources in the region. All students had extensive involvement in FPI farmer training programs under Obura's supervision.

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

<http://www.ag.purdue.edu/ipia/pics>

In the last five years, the PICS project has completed demonstrations in 30,800 villages with more than 1.6 million participating farmers. Manufacturers and local businesses have produced and sold more than two million PICS bags in West and Central Africa. In March 2012, PICS organized a mini-symposium during the 7th International IPM Symposium in Memphis, Tenn. During this conference, the PICS project was recognized with the International IPM Award. In April 2012, PICS organized a three-day Lessons Learned Workshop

in Accra, Ghana, attended by 113 participants from 19 countries representing agricultural research and extension services, NGOs, and the private sector. Throughout 2012, PICS will continue to implement activities to strengthen the supply chain so that the bags are available to farmers and other users.

Purdue Improved Crop Storage (PICS2) continued its research activities at Purdue and with partners INRAN in Niger, ICIPE in Kenya, and ICRISAT in India. The group continued to implement and expand research activities on more crops in several countries. PICS2 has launched experiments in Benin, Burkina Faso, Malawi, Mali, Ghana, Uganda, Tanzania, Mozambique, and Senegal. More than 10 crops of major importance were being evaluated. Several national research programs, NGOs, and other projects (Kenya, Malawi, Rwanda, Namibia, etc.) are testing the PICS bags for storage of other crops and for reducing harmful aflatoxins in maize and peanut. Preliminary results suggest that PICS bags can control pests of stored products without challenges in regions where high grain moisture is not an issue during harvest.

## COLLABORATIVE RESEARCH SUPPORT PROGRAMS (CRSPs)

### AquaFish CRSP

Kwamena Quagrainie (Agricultural Economics) and Jennifer Dennis (Agricultural Economics/Horticulture and Landscape Architecture) continued as PIs on the AquaFish CRSP projects in Kenya and Ghana. In Kenya, the work focused on demonstrating best management practices (BMPs) in aquaculture and on training fish farmers on various aquaculture technologies. BMPs emphasized the use of commercial formulated feed for better growth and economic performance, and water reuse to minimize the environmental impact of water effluents. They established and provided all needed supplies for six demonstration farms with varying layouts, pond sizes, and accessibility. They offered two workshops on BMP adoption to introduce farmers to management practices that enhance profitability of fish production. Those farmers also visited demonstration farms to experience BMP at work. About 150 farmers participated, and over 80 percent have adopted BMPs on their farms. A graduate student just completed data collection from participating farmers to assess the determinants of adoption of BMPs, the adoption rate of BMPs, and the economic benefit of adopting BMPs in Kenya. This project is expected to end September 2013.

The work in Ghana involves characterizing the current tilapia value chain performance in terms of cost-benefit comparisons and identifying areas for improvement. Data was collected during the summer of 2012 from aquaculture input suppliers, fish farmers, fish distributors, fish marketers, and restaurants. Data collection is almost complete and analyses will begin in September. This study

will provide some recommendations for strategic improvements and long-term sustainability in the tilapia value chain in Ghana.

### Horticultural CRSP (HORT CRSP)

Stephen Weller (Horticulture and Landscape Architecture) and Maria Marshall (Agricultural Economics) along with James Simon of Rutgers University are PIs on a newly awarded HORT CRSP project: 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. This project idea originated from a partnership between Purdue agriculture and AMPATH, a Kenyan organization headed by Indiana University School of Medicine and Moi University Teaching Hospital in Eldoret, which takes a comprehensive approach to HIV/AIDS and other communicable and noncommunicable diseases in Western Kenya. The emphasis of the project is improving rural livelihoods through the investigation of the value chain for the production and marketing of African Indigenous Vegetables (AIVs) that are known to be nutritiously rich and important components of a balanced diet. The AIVs include amaranth, spider plant, and African nightshade. This new HORT CRSP project is an extension of a one-year pilot HORT CRSP Immediate Impact Project that was centered only in Kenya. This new, three-year project has allowed the program to expand to Tanzania and Zambia. In this first year, activities have included household surveys of client farmers and intensive production experiments examining improved AIV germplasm, production and postharvest practices, pests and their management, and investigation of potential new and expanded markets for AIV sales, farmer training programs, on-farm testing, and capacity building through graduate education.

Other aspects of the project include testing new drying technologies for value addition, preparation of improved AIV recipes, and evaluation of nutrient composition of both fresh and processed AIVs. Our African partners in this project include Chepkoilel University and KARI in Kenya; AVRDC, St. Johns University, Sokoine University and the Horticulture Research Institute in Tanzania; and ASNAPP in Zambia. Other partners include Fintrac and ministries of agriculture in our partner countries.

### Integrated Pest Management (IPM) CRSP

Stephen Weller (Horticulture and Landscape Architecture) and Rick Foster (Entomology), working with partners in Honduras with recent involvement in Guatemala, are collaborating with in-country scientists to develop IPM packages for reducing pest problems and use of synthetic pesticides in horticulture crops. 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 assist small

growers in decision-making for disease management. Rotations of nematode-resistant cowpeas and biofumigant mustards showed good potential for reducing field populations of nematodes. They showed that interplanting sunflowers with eggplant was effective for reducing cosmetic damage by mites on eggplant fruit and may be a good practice for reducing pesticide use.

The undergraduate internship program with Honduras' Universidad Nacional de Agricultura (UNA, Catacamas, Olancho) was continued at Purdue University in 2012. Three students under the supervision of Foster, Weller, and Lori Hoagland (Horticulture and Landscape Architecture) worked on IPM projects in cabbage, tomato, and carrots as part of their senior thesis requirement. David Perla, a Honduran, began his studies at Purdue University in the Entomology Department working on nematode management strategies under the supervision of Virginia Ferris (Entomology) in January 2012.

The annual IPM CRSP Latin America region meeting was held in Guatemala from May 24–27 and was attended by Weller and scientists from Guatemala, Honduras, Ecuador, and the United States.

### Global Nutrition CRSP

Jerry Shively (Agricultural Economics) completed his second year as a Global Nutrition CRSP PI working in Nepal and Uganda, two USAID Feed the Future countries. 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 will examine the connections between agricultural capacity and nutrition outcomes. Three graduate students in Agricultural Economics supported by the project are addressing the project's goals to increase the capacity and effectiveness of research institutions in Nepal and Uganda and to train graduate students to become contributing members of the global community fight against hunger and malnutrition.

### Sorghum, Millet, and Other Grain CRSP (INTSORMIL)

Bruce Hamaker (Food Science) was active in projects in West Africa focused on expanding markets for sorghum and millet for local smallholder farmers. In Mali, the local USAID mission-funded project, Transfer of Sorghum, Millet Production, Processing and Marketing Technologies in Mali, was curtailed due to the coup d'état in March, the last year of the five-year project. Good progress was made in empowering entrepreneurial processors to put high quality, competitive sorghum and millet products into the marketplace, and processors were successful even after the close of the project. An Incubation Center was established and continues to operate at

the national agricultural research center in Bamako. The center exposes local processors to mechanized sorghum and millet processing technologies and to train and assist them in expanding their businesses. The Incubation Center continued to operate post-project.

In other activities, master's student Morgan Goodall graduated in May. In collaboration with Gebisa Ejeta (Agronomy), she showed that high digestibility, high-lysine sorghum has proteins with viscoelastic properties that made flour from this cultivar perform better in a composite sorghum-wheat bread system. This work aims to make this novel cultivar useful in composite bread systems at a higher higher-than-normal incorporation rate. Fatima Cissé, a graduate student in Hamaker's group, successfully bypassed a master's and directly entered a PhD program. Fatima completed her studies on the value of sorghum and millet foods in providing extended energy to the body compared to rice, potatoes, and pasta—common imported foods in Mali. She has been moved to a Bill and Melinda Gates Foundation-funded project for her PhD.

John Sanders (Agricultural Economics) continued collaboration with IER (national agriculture research agency) and began USAID-Mali financed activities in Mali before the March 2012 coup and the loss of the north to the rebels. The project funded an area expansion of 500 ha in the Koutiala region managed by AMEDD (national NGO) and 280 ha in the Mopti region managed by the DRA (national extension service). Improved seed, inorganic fertilizer, good agronomic practices, new marketing practices, and the development of farmers' associations are the program components. The very popular sorghum cultivar Grinkan from the Koutiala diffusion has spread into our McKnight Foundation program in Burkina Faso and Niger. This program covers approximately 150 ha in each country. Sanders also collaborated with a Senegal program, on scaling up new millet technologies to be sold to the yogurt-producing firm of Pierre Ndiaye. On the academic side, Jeanne Coulibaly, in her PhD thesis, analyzed new technology introduction in Mali. Coulibaly now works in an international research center in Benin. Two master's theses were finished on new sorghum technologies for dairy production in El Salvador (Alexis Villacis) and Nicaragua (Gabriel Garcia). Another two theses are in progress in Niger on scaling up new technology (Abdoulaye Ibrahim) and an adoption study in Nicaragua (Gautam Kumaraswamy).

Mitch Tuinstra (Agronomy) continued to lead an INTSORMIL project titled Developing Sorghum with Improved Grain Quality, Agronomic Performance and Resistance to Biotic and Abiotic Stresses. Sorghum is poised to play a key role in expanding agricultural development and food security in countries around the world. The overarching objective of Tuinstra's project is to develop and deploy genetic technologies that improve sorghum production, performance, and value through plant breeding. Graduate students and visiting

scientists with interests in crop improvement and molecular biology were hosted for short-term and graduate training at Purdue.

A technology package that combines hybrid seeds and herbicide seed treatments to improve *Striga* resistance is being evaluated in Nigeria, Niger, Burkina Faso, and Mali. Tuinstra continued to work with DuPont Crop Protection to develop this technology package to increase grain yields of sorghum in the West Africa region. He is also working with researchers at IAR-Nigeria, farmers, the public and private seed sector, and regulatory agencies to commercialize this technology in West Africa.

In more fundamental genetic research studies, the sorghum genome sequence is being used as a tool to identify allelic variation in genes that influence specific grain quality or crop production traits. Several stable *dw<sub>3</sub>* alleles of sorghum have been identified and a DNA marker system to control of height mutants in commercial sorghum parent lines and hybrids was developed. These alleles are being incorporated into commercial cultivars to improve the agronomic performance of improved varieties and hybrids.

Biochemical selection strategies are also being used to evaluate the potential for manipulating dhurrin and HCN production in sorghum. Dhurrin accumulation negatively impacts forage and feedstock quality. Two genetic mutants of sorghum that do not accumulate dhurrin have been identified. Sorghum mutations that disrupt dhurrin biosynthesis represent an important genetic tool for developing new, high-value forage or bioenergy sorghum feedstocks. Development of dhurrin-free sorghum forages has the potential to replace corn and other forage crops that have lower water-use efficiency characteristics.

The Mali Training Program, managed by IPIA, came to an abrupt end in June 2012 due to political unrest in Mali following a mid-March military coup. The Department of State suspended all activities involving the Mali Government, so USAID could no longer support the academic training of the five Mali students, because they were employees of IER, a government research institute. As of June 30, Bandiougou Diawara completed his master's degree in agronomy at Kansas State University and returned to Mali. Mali Mission released the other students to complete their degrees, if supported by other funding. The four remaining students were successfully moved to other funding at their respective universities and are pursuing the completion of their programs. In the fall of 2011, the final short-term crop production trainee, Abdoul Wahab Toure, spent eight weeks at Kansas State University working with Vara Prasad and Scott Staggenborg on crop physiology and production research activities on sorghum and soybean.

### NEWS OF THE DEPARTMENTS

#### Agricultural and Biological Engineering (ABE)

**Indrajeet Chaubey** presented a paper entitled “Improving the simulation of biofuel crop sustainability assessment using SWAT model” in the International SWAT Conference and Workshop held in Toledo, Spain, June 13–17, and served on the Conference Scientific Advisory Committee. He also traveled to University of Queensland as a member of the Water Faculty team and led a series of discussions with the faculty, department heads, and directors to explore possibilities of student, post-doc, and faculty exchanges in various areas of engineering, agriculture, and science. Chaubey collaborated with faculty from the UNAM University, Mexico, to develop a Global Design course related to constructed wetlands. He also is a Co-PI (with Jose Fabrega, Hydraulics and Hydrotechnical Research Center at the Technical University of Panamá) on a funded proposal titled “Caracterización de Aspectos Físico-Químicos de Cuencas Hidrográficas de Rápido Desarrollo como base para un Manejo Sostenible.” In addition, he hosted a visiting student from the Technical University of Panama for three months in 2011.

**William Field** spent six days in May 2012 working at the Swedish Institute of Agricultural and Environmental Engineering on a project where he serves as an advisor. The project explores stress on both the livestock producer and cattle during the loading and unloading operation, when many injuries occur. This is his second visit to the institute over the past year. Articles have been prepared addressing the effects of cold exposure on older farmers with physical impairments such as amputations, arthritis, and respiratory conditions. During his visit, he visited the University of Uppsala’s new \$30 million animal science complex, complete with a biodigester for fuel production and state-of-the-art robotic milking facilities. In August 2011, Field attended the Irish Meeting on Agricultural Occupational Health and Safety, Dublin, Ireland, and presented the keynote on U.S. activities.

**Klein Ileleji** accompanied a Global Design Team made up of students from agricultural and biological engineering, agricultural systems management, and other engineering departments to Cameroon to build and test their next generation of the Basic Utility Vehicle for application in transporting individuals in rural Cameroon.

**Joseph Irudayaraj** presented his research titled “Single cell epigenetics” at the Second International Breast Cancer Symposium: Epigenome, Nutrition, & Public Health in Rennes, France, October 2011.

**Monika Ivantysynova** was a keynote speaker at the 4th International Conference on Mechanical Engineering and Mechanics (ICMEM). Her keynote lecture, “Displacement control—the

future of fluid power systems” was presented in Suzhou, PR China. Ivantysynova and her students were well represented at the 7<sup>th</sup> PhD Symposium held Reggio Emilia, Italy, June 27–30, 2012. They had seven accepted papers and two posters for presentation. Ivantysynova and members of the Maha Fluid Power Laboratory also presented three papers, including a keynote address by Ivantysynova, at the 8th International Conference on Fluid Power (IFK) in Dresden, Germany, March 26–28, 2012.

**Mike Ladisch** traveled to China, Colombia, and Russia this past year to begin outreach efforts to further complement the international component in the Laboratory of Renewable Resources Engineering (LORRE). He participated in the Sixth International Forum on Food Safety, Shanghai, China, September 26–28, 2011; the First Colombia-Purdue International Collaboration Forum, Colombia-Purdue Institute for Advanced Scientific Research, October 13, 2011; and the IV International Forum, Nanotech & Green Energy Section, Moscow, Russia, October 28, 2011. Students from Turkey and Colombia have worked in or are currently pursuing research in LORRE.

**John Lumkes** assisted with the program in Cameroon called Engaging Students and Partners in Service Learning Engineering Design Projects, and presented a paper at the 2011 Scandinavian International Conference on Fluid Power in Tampere, Finland.

**Nathan Mosier** gave a plenary lecture titled “Biochemically Derived Liquid Biofuels from Plant Biomass” at the 5<sup>th</sup> International Symposium on Biomanufacturing at the National University of Colombia–Medellín in August. Mosier also presented two seminars titled “Lignocellulose Recalcitrance and Pretreatment” and “Challenges in Fermenting Cellulose-Derived Sugars.”

**Jiqin Ni** presented a paper entitled “Aerial pollutant concentrations in high-rise and manure belt layer houses” at the International Symposium on Health Environment and Animal Welfare (ISHEAW-2011), Chongqing, China, October 2011. He also signed a “Letter of Intent for International Collaboration in Research and Development for Health Environment and Animal Welfare” with Chongqing Academy of Animal Sciences (CAAS), China, and six universities in Australia, the Netherlands, and the United States.

**Jenna Rickus** participated in two international meetings in 2011. She gave a podium talk at the second International Conference on Multifunctional, Hybrid and Nanomaterials in Strasbourg, France, and spoke at the Physiological Sensing Symposium in Beijing.

**Steve Swain**, the assistive technology specialist for the National AgrAbility Project (NAP), staffed a display at the 2011 conference for FICCDAT/RESNA (Festival of International Conferences on Caregiving, Disability, Aging and Technology/Rehabilitation Engineering and Assistive Technology Society of North America) in Toronto, Ontario, Canada, on June 5–8, 2011. He also conducted a workshop on

Evaluating Agricultural Equipment for Secondary Injury Hazards. The session was well attended and, as one attendee stated, had the most discussion of any workshop he had attended. The next RESNA Conference will be June 28 through July 3, 2012, in Baltimore, Maryland. Additional information can be found on the new RESNA website: [www.resna.org](http://www.resna.org).

**Andrea Vacca** served as reviewer, session organizer, and chair for the 7<sup>th</sup> Fluid Power Nat International PhD Symposium on June 2012 in Reggio Emilia, Italy.

During May and June, ABE students participated in the Global Engineering Program's Global Design Teams in Cameroon, Palestine, India, and Colombia. More information about all of these projects can be found at <https://engineering.purdue.edu/GEP/Programs/GDT>.

### Agricultural Economics

**Philip Abbott** and graduate student Ce Wu worked with the Central Institute for Economic Management (CIEM) in Vietnam on a project funded by the University of Copenhagen and Danida (the Danish aid agency). Their research focused on the linkages between international trade and economic development that have contributed to rapid growth and significant poverty reduction in Vietnam. Abbott also worked with the World Institute for Development Economics Research (WIDER), a branch of the UN University located in Helsinki, on impacts on developing countries of the 2007–08 food crisis and international responses.

**Corinne Alexander** traveled to Malawi in the summer of 2011 with graduate student Mike Jones as part of the Purdue Improved Cowpea Storage 2 (PICS2) project, funded by the Bill and Melinda Gates Foundation. Jones collected grain storage data in Malawi during the harvest season of May–July 2011 and then the lean season from January–February 2012. Based on this research, two papers and a poster were presented at the PICS Conference held in Accra, Ghana, in April 2012. Alexander traveled to Ghana in August 2011 as part of a multidisciplinary project led by Klein Ileleji (ABE). This project was funded by the Purdue Global Policy Research Institute with the goal of better understanding the challenges Ghanaian farmers face with post-harvest losses. Alexander also participated in a workshop on organic agriculture at INRA (National Institute of Agricultural Research) in Avignon, France, in May 2012. While there, she presented a working paper from student Michael Veldstra's thesis, "To Certify or Not to Certify? Decomposing the Organic Production and Certification Decisions." In June, Alexander attended the International Food and Agribusiness Management Association's Annual meeting in Shanghai, China, where Veldstra, Alexander's master's student, presented a paper from his thesis.

Alexander coached the Purdue case-study team which placed 4<sup>th</sup> out of 17 teams in the IFAMA case competition.

**Joseph Balagtas** spent much of the past year in the Philippines, where he conducted research on rice markets at the International Rice Research Institute and taught at the University of the Philippines at Los Banos. His sabbatical was funded in part by a Fulbright Senior Scholar grant. Balagtas used his time in the Philippines to initiate research projects illuminating the economics of food security and poverty in rural Asia, as well as the effects of "stabilization" policies that governments in the Philippines and elsewhere have implemented ostensibly to protect rice producers or consumers from low/high prices and/or price volatility. Back at Purdue, Balagtas continues to work on these pressing issues in international agriculture. He has several related manuscripts in submission at peer-reviewed journals, and his PhD student, Jeff Michler, received a Borlaug Fellowship in Global Food Security to help fund his dissertation research on coping mechanisms among rice-growing households in Bangladesh.

In June 2012, **W. Scott Downey** took a group of 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 Chef Roberto Zanieri 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 students 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.

**Raymond Florax** spent a sabbatical during the Spring 2012 semester at the University of Waikato, National Institute of Demographic and Economic Analysis (NIDEA), in Hamilton, New Zealand. He presented a keynote lecture at the NIDEA Seminar on agriculture, transportation, and the timing of urbanization. He also visited the Faculty of Economics and Statistics of the University of Innsbruck in Austria, where he lectured on obesity in urban food markets.

**Kenneth Foster** presented a paper with Brandon Hollas (graduate student), Paul Preckel, and Brian Richert at the 5<sup>th</sup> Annual International Symposium on Agriculture, July 16–19, 2012, in Athens, Greece. The paper was entitled "An Economic Assessment of DDGS Diets for Crop-Hog Farms." This international symposium draws scientists working in multiple disciplines from around

the world to share research and examine key problems facing global agricultural production and natural resource management challenges.

**Jacob Ricker-Gilbert** joined the faculty in Agricultural Economics in August 2011 and since that time has been working to develop an international portfolio of research and engagement activities. Over the past year he has been working with Gerald Shively from Agricultural Economics to inform policy-makers and academics on the economic and social impacts of how large-scale input subsidy programs in Africa affect small farmers. Ricker-Gilbert presented his findings on the topic to USAID-Malawi in October 2011. Shively and Ricker-Gilbert also hosted an organized symposium on input subsidies in Africa at the International Association of Agricultural Economists Triennial meeting in Foz do Iguacu, Brazil, in August 2012. Ricker-Gilbert is also working with Thom Jayne from Michigan State University on a project funded by the Bill and Melinda Gates Foundation that investigates the impacts of population growth on agriculture and household wellbeing in Africa. In May 2012, Ricker-Gilbert traveled to Ethiopia with graduate student Anna Josephson to collect data from farmers and work with Ethiopian collaborators on the topic.

**Paul Preckel** presented a series of lectures to faculty and students in the College of Economics and Management at China Agricultural University, Beijing, China. Topics ranged from the economics of intensive swine production to pest management for stored corn in Indiana to methods for the measurement of the efficiency of agricultural banks. He also attended the International Meeting of the Institute for Operations Research and Management Science (INFORMS) in Beijing, presenting a paper with Clay Davis, Andrew Liu, and Douglas Gotham on how to modify electricity grid operations that include wind power generators. Preckel also hosted a delegation of academics and utility industry professionals from Kosovo for a three-day workshop at Purdue. The focus of the workshop was on evaluating the benefits of regional international cooperation and increasing electricity trade. It included field trips to the offices of the Midwest Systems Operator and Indiana Utility Regulatory Commission in Indianapolis and to Duke's Edwardsport integrated gasification and combined cycle electricity generation facility, which is currently under construction.

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

**Juan Sesmero** made a brief presentation on biofuels-related research in the department at the Research Coordination Network on Pan-American Biofuels and Bioenergy Sustainability: Workshop 2012 that was held May 28 to June 1, 2012, in Merida, Mexico. The overarching goal of this group is to develop a comprehensive and

standardized criterion for sustainability assessment of alternative bioenergy sources.

**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 Global Nutrition CRSP project are discussed in the previous CRSP section. He continued to partner with a number of colleagues on agricultural development research in other locations, including the Philippines, Malawi, Ethiopia, and elsewhere. He has spent the past year 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. He also maintained an Adjunct Professor position at the Norwegian University of Life Sciences, where he teaches an occasional summer short course.

**Wallace E. Tyner** and graduate student Ismail Ouraich were involved in a project to determine the extent to which trade liberalization might help countries adapt to climate change. They used a data set that provides global yield estimates for 17 regions/countries, 14 crop categories and four SRES scenarios spanning 2010–2100. In other words, they have projections under four climate scenarios for all major crops and global regions. They then run simulations of these yield impacts in GTAP under alternative trade liberalization scenarios and assess the extent to which trade liberalization helps countries adapt to adverse crop yield impacts that are different across global regions. They have learned that some countries and regions will find trade liberalization is a good means of helping to adapt to adverse agricultural impacts of climate change. However, for other countries and regions, trade liberalization does not help reduce the negative impacts of climate change. Their analysis is focused on North Africa with special attention to Morocco and Turkey as case study countries. They have also developed a country economic model for Morocco to estimate how agricultural development policies could help the country adapt to negative crop yield shocks. This research will be presented at an international conference, Climate Change and Development Policy, September 26–29, 2012, in Helsinki, Finland.

In Spring 2012, **Brigitte Waldorf** spent her sabbatical at the New Zealand Institute of Demographic and Economic Analysis (NIDEA), University of Waikato, New Zealand. She presented a lecture entitled “Wasting their Brains? Immigrants’ Labor Market Experiences in the United States” at the School of Geography, Resources and Environment of Victoria University Wellington, New Zealand. She also presented a paper entitled “Job-education Mismatches among Immigrants in the US” at the International Workshop on the Economic Impacts of Immigration and Population Diversity that was jointly organized by NIDEA and Motu Economic and Public Policy Research.

**Holly Wang** visited Australia with her PhD advisee funded by Purdue Global Engineering Programs. She gave talks at University of Queensland on food safety and at James Cook University on global food crisis in May 2012. She also made several trips to China, serving as a keynote speaker at the International Agricultural Risks, Finance and Insurance Conference in June 2012; an invited speaker at the China Agricultural Economic Review and the International Food Policy Research Institute annual conference in October 2011; the Chinese Economists Society (CES) Presidential Forum in Shanghai in December 2011 and the CES annual conference in Kaifeng in June 2012; and a symposia co-chair at the International Food and Agribusiness Marketing Association (IFAMA) annual conference in Shanghai in May 2012. She gave seminars in Nanjing Agriculture University, Central University of Finance and Economics, and Zhejiang University in China.

**Steven Wu** was hosted by the Department of Economics at the University of Melbourne in Melbourne, Australia, as an honorary fellow from January to April 2012. While in the department, he was invited to give a research seminar and collaborated with Nisvan Erkal, a professor of economics, on research that can help improve economic modeling of contracting relationships between large companies and small firms. The model can potentially be useful for modeling agricultural contracting relationships and associated policy issues. Wu was also invited to give research seminars at Deakin University and the University of Sydney. From April to May 2012, Wu was a visiting scholar in the Department of Economics at Monash University in Melbourne. While at Monash, he was invited to give a workshop on Research Opportunities in Agricultural Economics which provided an overview of agricultural economics research and contemporary policy and business issues in food marketing channels.

### **The Center for Food and Agricultural Business (CAB)**

staff visited Sweden, Switzerland, and Argentina, 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, and David Downey were active with CAB programs.

**The Center for Global Trade Analysis (GTAP)**, led by **Thomas Hertel** and **Terrie Walmsley** Executive Director and Director respectively, is a global network of researchers and policy makers conducting quantitative analysis of international policy issues. In 2012, the Center released the GTAP 8 Data Base, which boasts dual reference years of 2004 and 2007, 129 regions and 57 sectors, and contains bilateral trade information, transport, and protection linkages. The Center's 15<sup>th</sup> Annual Conference on Global Economic Analysis and advisory board meeting were held in Geneva,

Switzerland, June 2012. These events were hosted by the World Trade Organization, International Trade Centre, and the United Nations Conference on Trade and Development. The conference was represented by 234 participants from 43 countries and 156 papers were presented.

### **Agronomy**

**Sylvie Brouder** presented a lecture titled “Minimum plant and soil metrics for characterizing Environment (E) x Management (M) impacts on crop performance” at the Yield Gap Assessment Workshop, Beijing, China, August 31–Sept. 2, 2011. While in Beijing, she participated in the China Agricultural University Seminar Day and presented “Impact of climate change on crop nutrient (and water) use efficiencies.” In February 2012, Brouder and Jeff Volenc presented a paper titled “Impact of Climate Change on Crop Nutrient and Water Use Efficiencies: What we know we don't know” at the Plant Growth, Nutrition and Environment Interactions Conference at the University of Veterinary Medicine, Vienna, Austria.

**Melba Crawford** gave the keynote presentation titled “Nonlinear Manifolds for Feature Extraction: Opportunities and Challenges” at the IEEE Workshop on Hyperspectral Image and Signal Processing—Evolution in Remote Sensing held in Portugal June 7, 2011.

**Gebisa Ejeta** continued as the Director of the Purdue Center for Global Food Security. In coordination with Gary Burniske, managing director of the Center for Global Food Security, they established the Borlaug Summer Institute on Global Food Security. This was a two-week training session held at Purdue for some of the world's brightest students to help fight the hunger problem, which is growing at an exponential rate.

**Richard Grant** was an invited lecturer at the FLAIR 2011 (Field Applications in Industry and Research) in Murnau, Germany. His talk was titled “Application of tunable diode lasers to study emissions from area sources.” Grant also presented his research paper at the International Symposium on Emissions of Gas and Dust from Livestock in St. Malo, France, June 10–13, 2012. Grant was appointed Distinguished Professor by Mexico Academy of Sciences and served as a member of the Board of Directors, Global Education Morocco, which operates a 700-student school in Casablanca, Morocco.

**Yiwei Jiang** served as proposal reviewer for The Qatar National Research Fund (March 2012) and as associate editor for *International Turfgrass Research Journal* (May 2012). Jiang also gave several invited presentations: 1) “Physiological and Genetic Dissection of Drought Tolerance in Grasses,” Shanxi Agricultural University, Taiyu, China, July 4, 2011; 2) “Scientific Writing”

Inner Mongolia Agricultural University, Huhehot, China, June 14, 2012; 3) “Scientific Writing,” Tea Institute, Guangdong Academy of Agricultural Science, Guangzhou, China, June 21, 2012; and 4) “Candidate Gene Association Mapping of Drought Tolerance in Perennial Ryegrass,” Gordon Research Conference, Salt and Water Stress, Hongkong, China, June 25, 2012.

**Jianxin Ma** was invited to speak at three international meetings this past year: invited plenary speaker in the 41st Annual Symposium of the Korean Society of Breeding Science, Daejeon, Korea, July 2011; invited speaker in Plant Genome Evolution Conference in Netherlands, September 2011; and invited plenary speaker in the XIV National Congress of Biochemistry and Plant Molecular Biology & 7th Symposium Mexico–USA, November 2011. He also served as a panelist for the National Natural Science Foundation of China Biology Program, July 2011.

**Cindy Nakatsu** served as a member of the Terre Genome Project, metadata selection working group and was on sabbatical leave (August–December 2011) at Hokkaido University, Sapporo, Hokkaido, Japan. She was working on a collaborative project to characterize genes coding for resuscitation promotion factors (RPF) in bacteria.

**Dev Niyogi** was an invited speaker at the Asian Oceanic Geoscience Society (AOGS) annual conference in Taipei, Taiwan, 2011. He also presented at the climate change meeting at Durban, South Africa, in August 2011; and the Indian Institute of Technology, Delhi, India, Center for Atmospheric Sciences. His South Africa talk was titled “Improving model projections and vulnerability assessments by adapting land surface feedback within regional climate studies over the Western Himalayas.”

**Torbert Rocheford** has been cooperating with HarvestPlus to study the genetics and breeding of orange maize since 2003. HarvestPlus is nonprofit organization devoted to developing bio-fortified crops to address important micronutrient deficiencies as identified by the World Health Organization (WHO). Bio-fortification is the process of improving crops through traditional breeding. This is important for adoption of crops in many parts of the world where GMOs are not accepted. HarvestPlus in Zambia is currently working to develop high proVitamin A orange maize to help alleviate the chronic vitamin A deficiency (VAD) in that country. It is estimated that half of Zambian children are vitamin A-deficient. Four graduate students from the Agronomy Department, Brenda Owens, Tyler Tiede, Hannah Schneider, and Amanda Leafgren, have travelled to Zambia to learn more about the HarvestPlus program there.

**Lori Snyder** hosted an Argentina Seed Association Student Group visiting Purdue on August 25, 2011. The students participated in her introductory Crop Production Course in AGRY 105. Snyder’s

Maymester course traveled to Costa Rica and Panama and led service projects in both countries. She developed a new mobile app to help identify tropical plants of Costa Rica. The app is available for iPhone and iPad and is called *Green Notes-Costa Rica*. Snyder partnered with ITaP technology consultants to help students, tourists, and plant enthusiasts search for and take notes about plants. The app provides a digital, searchable plant library, allowing users to contribute to the resource by capturing plant images. Snyder also completed the 44-page *Self-Guided Tour Book* (AY-333) for Finca Pangola, Costa Rica.

**Mitch Tuinstra** continued coordinating international research and education programs focusing on maize and sorghum crop improvement. His work with the Sorghum, Millet, and Other Grain CRSP is discussed in the previous CRSP section. In addition to active research and teaching programs, he was invited to speak at the International Association for the Plant Protection Sciences Conference in Honolulu, Hawaii, highlighting the role of seed treatments for managing *Striga* infestations in sorghum. He also was invited to present a paper at the Sorghum Improvement Conference of North America in Manhattan, Kansas, summarizing results of research on development of genetic technologies that could be used to manage dhurrin content and HCN production in sorghum.

**George Van Scoyoc** traveled to Kenya with **Brad Joern** and **Darrell Schulze** from September 8–22, 2011. He visited colleagues at AMPATH and Chepkoilel University College, a constituent college of Moi University, and discussed collaboration on outreach and research to provide support to the food security initiative. He cohosted Erika Michéli, Professor of Soil Science and Dean of International Programs at Szent Istvan University, to work on a soil classification project with Phillip Owens and the National Resources Conservation Service. He took the opportunity to discuss future study abroad opportunities for our students in Hungary and Central Europe. Van Scoyoc taught two international courses—AGRY 598, African Development Activities, Spring 2011; and AGRY 399/AGEC 498, Afghanistan: Development Challenges Facing a Country at War, Fall 2011. Van Scoyoc, along with **Shaun Casteel** and **Tony Vyn**, participated in the Indiana National Guard Afghan Agricultural Development Team training program, which prepares military deployed to Afghanistan to work as agricultural extension agents.

**Jeff Volenec** and **Sylvia Brouder** co-authored and presented a paper titled “Nutrient Use in Bioenergy Cropping Systems” at the Plant Growth, Nutrition and Environment Interactions Conference at the University of Veterinary Medicine in Vienna, Austria, Feb. 18–21, 2012.

**Tony Vyn** continued to serve as the associate editor for the international journal *Soil & Tillage Research* (2004–present). Vyn hosted several visiting scholars to work in his lab: Prof. Zhigang

Wang from Inner Mongolia Agricultural University in Huhhot, China from March 15 to July, 2012; Fernando Aramburu (Agricultural Engineering—IR-graduate) from University of Mar del Plata, Balcarce, Argentina from April to December, 2011; and Mariana Robles (master's student) from University of Mar del Plata, Balcarce, Argentina from August to October 2011. In June 2011, Vyn presented three invited lectures in China: “Recent perspectives on phenotyping for NUE and yield in maize at multiple densities,” Chinese Academy of Agricultural Sciences at national and provincial levels in Beijing, Harbin (Heilongjiang Province), and Changchun (Jilin Province); “Research experiences with management influences on nitrous oxide emissions in high yield maize systems,” Chinese Academy of Agricultural Sciences, Beijing, China; and “Enhancing NUE in maize production,” China Agricultural University in Beijing, China.

### *Student Internships at the James Hutton Institute, Scotland:*

The James Hutton Institute was formed on April 1, 2011, when the Macaulay Land Use Research Institute and Scottish Crop Research Institute (SCRI) joined forces to create a world-leading research institute for land, crops, water, and the environment. The Institute hosted two undergraduate and two graduate students from Purdue the summer of 2012. The students were involved in different research activities in the Dundee site, including barley genetics and breeding, fruit biochemistry, fruit entomology, and fruit breeding.

### *Student Summer 2012 Experiences in Kenya and Zambia:*

Nine undergraduate and graduate students spent the summer in Africa on programs coordinated by the Agronomy Department. Five students spent 10 weeks in Eldoret, Kenya, working with colleagues at AMPATH (<http://www.ampathkenya.org/>) and at Chepkoilel University College (<http://www.chep.ac.ke/>), a constituent college of Moi University. AMPATH, a partnership between Moi University School of Medicine and a consortium of U.S. universities lead by the IU School of Medicine, treats over 140,000 HIV-positive

persons at over 60 urban and rural clinic sites throughout western Kenya. Purdue students prepared materials for AMPATH's Agricultural Extension Programs, collected information on African Indigenous Leafy Vegetable production, and conducted fieldwork for preparation of a



digital soil map of the Eldoret area. Four students in Plant Breeding and Genetics spent three weeks in Zambia shadowing a nutrition study involving high Pro-Vitamin A maize. The nutrition study, which follows initial work by the Torbert Rocheford's lab to breed and develop lines with higher levels of this crucial nutrient, is being

conducted by the University of Wisconsin-Madison and HarvestPlus-Zambia with the aim of eliminating Vitamin A deficiency in children in the developing world. The group spoke with local plant breeders, agronomists, government officials, and farmers involved with the project. Later, they spent time at the sites in rural Zambia where the study in children was taking place and assisted with the work being done there.

## Animal Sciences

*Layi Adeola* attended the British Poultry Science and the British Society of Animal Science meetings in Nottingham, England, and also attended research planning meetings in Dublin, Ireland. He visited the University of Ibadan and University of Agriculture in Abeokuta, Nigeria, and held discussions on research collaboration, graduate student training, and visiting scientist exchange with the primary aim of improving human capacity in teaching and research. Adeola chaired the Advancia International Methionine Seminar Series and the Advancia Seminar series in Cesme, Turkey—a one-day International Amino Acid seminar series that provides a forum for both professionals in industry and academia to exchange research information and ideas. At the invitation of the Sichuan Agricultural University, Adeola gave talks at Sichuan Agricultural University in Yaan, Sichuan, China, and spent time with Total Quality Logistic Service (TQLS) group presenting seminars in Mianyang and Cheng Du, Sichuan, China.

*Todd Applegate* presented talks at the Poultry Nutrition Summit Conference in Beijing, P.R. China, The World Nutrition Forum in Singapore and the International Phytase Summit in Rome, Italy. Applegate and *Scott Radcliff* hosted nine undergraduate from Zhejiang University (China) and two students from the University of Taiwan (Taiwan) as part of the Summer Research program. In July Applegate, *Heng-wei Cheng*, and *Barry Delks* organized a one-day animal sciences industry tour for the visiting undergraduate students and 12 international interns from Novus International. This program has been instrumental in attracting 15 students from China to the Purdue Animal Sciences graduate program.

*Ryan Cabot* spent his research sabbatical with Professor Michael Bader at the Max Delbrück Center for Molecular Medicine in Berlin, Germany (January–May 2012). Cabot and members of Bader's laboratory worked to identify the intracellular proteins transported by the karyopherin alpha family of nuclear transport receptors. This class of transporters serves a critical regulatory role in development and differentiation. Since returning to Purdue, Cabot and Bader continue to collaborate and are working together to characterize a reproductive phenotype observed in transgenic mice produced by Bader's lab that lack karyopherin alpha 6.

*Shawn Donkin* was invited to present at the European Society of Animal Production in Stavanger, Norway; the International Congress on Farm Animal Endocrinology-ICFAE in Bern, Switzerland; Expoleche San Marcos, Aguascalientes, Mexico (an applied dairy nutrition conference); as well as Formulação de Dietas de Gado

de Leite - II Formuleite, Lavras, Minas Gerais, Brazil (an applied nutrition conference). Donkin presented information about Purdue University and the opportunities in animal sciences to the Dairy Group (40–50 students) at the Universidade Federal de Lavras, Minas Gerais, Brazil, and presented and had discussions with animal and veterinary sciences graduate students at the Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil. He was instrumental in developing relationships with Graduate Directors at Universidade Federal de Lavras (UFLA), Lavras, Brazil, and Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil, to initiate opportunities for graduate student and faculty exchanges.

**Shihuan Kuang** attended the 9<sup>th</sup> Biannual Conference of Chinese Biological Investigator Society held in Hunan, China, and hosted a round table discussion on tissue stem cells. Kuang was invited to give a seminar at the College of Animal Sciences, Zhejiang University on May 30, 2012. He also met with the research group of Yizhen Wang and developed collaboration to dissect the role of AMPK in muscle growth and regulation of muscle-fat interaction. On June 13, 2012, Kuang gave an invited seminar at the Institute of Oceanology, Chinese Academy of Sciences, where he is currently a visiting professor. Kuang discussed research collaborations on stem cell mediated muscle growth with the Laboratory of Marine Molluscan Genetics and Breeding (Lab leader: Guofan Zhang).

**Zoltan Machaty** spent a sabbatical (January–June, 2012) in the laboratory of Karl Swann at the Wales Heart Research Institute at Cardiff University in Cardiff, Wales, United Kingdom.

**Alan Mathew, Heng-wei Cheng,** and **Paul Ebner** visited Zhejiang University and Nanjing Agricultural University for discussions centered on development of graduate student exchanges and bilateral research. Blair Aldridge and Kaitlin Condron were the first Animal Science graduate students to participate in the program and spent 6 weeks conducting research at Zhejiang University.

**Bill Muir** taught two workshops for the European Institute in Statistical Genetics in conjunction with the 4<sup>th</sup> International Congress of Genetics: University of Edinburgh, Edinburgh, UK; and presented an invited plenary talk at the 4<sup>th</sup> International Conference on Quantitative Genetics: Understanding Variation in Complex Traits also in Edinburgh, UK. As part of Muir's USDA/National Research Initiative (NRI) grant, "Development and field evaluation of genome-wide marker-assisted selection (GWMAS) over multiple generations in commercial poultry" he collaborated with co-investigators: Hendrix Genetics in the Netherlands (Gerard Albers, Addie Vereijken, Annemieke Jungerius), Theo Meuwissen (Department of Animal and Aquacultural Sciences, Norwegian University of Life Sciences in Ås, Norway), and the Wageningen University (Martien Groenen, Richard Crooijmans, Hendrik-Jan Megens, John Bastiaansen) in The Netherlands.

**Mark Russell** collaborated with Haley Oliver (Food Science) in teaching ANSC 49400, Animals & Food Security: Service Learning in

Haiti and took 18 students to Haiti during winter break to partner with the Université de Antenor Firmin (UNAF) in Cap-Haitien, Centre technique d'entrepreneuriat 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 ANSC 49400, Animals & Food Security: Service Learning in Romania. Using the Heifer International model, 18 Purdue students and seven students from University of Agricultural Sciences and Veterinary 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. In March, Russell was an invited speaker at the International Equine Science Meetings in Regensburg, Germany, and presented "Solving Current Domestic Horse Nutrition Challenges," Mark A. Russell and Blaire E. Aldridge, Purdue University.

**Terry Stewart** served on the advisory board for the Plant and Animal section of Centro de Estudos de Recursos Naturais, Ambiente e Sociedade–CERNAS in Portugal. CERNAS is a national funding program in Portugal similar to the USDA National Institute of Food and Agriculture (NIFA). Additionally, Stewart served as an external reviewer for FAO to screen proposals of the Funding Strategy for the Implementation of the Global Plan of Action for Animal Genetic Resource. These proposals are to support animal germplasm preservation programs in third-world countries.

## Biochemistry

**Clint Chapple** welcomed Teagen Quilichini to his lab in September 2011 for six weeks. Quilichini is a visiting fourth-year PhD student in the Department of Botany at the University of British Columbia. Her research focused on understanding the composition and formation of sporopollenin, a highly resistant biopolymer that protects the surface of spores and pollen walls. She utilized the biochemical expertise and assistance available in the Chapple lab to investigate the nature of sporopollenin precursors *in planta*, through the use of known Arabidopsis mutants.

**Barbara Golden** gave a talk entitled, "The HDV ribozyme has a hybrid engine," at the 2011 Meeting of the RNA Society in Kyoto, Japan.

**Mark Hall** continued his international collaboration with Foong May Yeong from the Department of Biochemistry in the Yong Loo Lin School of Medicine, National University of Singapore. Yeong studies mechanisms for controlling the completion of cell division and ensuring stability of the genome, which overlaps with Hall's research interests. The collaboration began several years ago when they discovered they had the same idea that a key protein involved in cytokinesis in budding yeasts might be a novel Cdc14 substrate. Yeong's lab had expertise in cell biology and Hall provided the expertise in Cdc14 biochemistry and enzymology. The collaboration

led to a publication in *Molecular Biology of the Cell*. They plan to continue this work by identifying and characterizing other new targets of Cdc14 that are important for coordinating cytokinesis (the final step in cell division when daughter cells separate from each other) with the completion of chromosome segregation.

**Jim Forney** traveled to the Orthodox Academy of Crete (Kolybari, Crete, Greece) to present his research at the International Ciliate Molecular Biology meeting sponsored by the Federation of American Societies for Experimental Biology. He gave a talk entitled “SUMO pathway components in *Tetrahymena thermophila* are essential and nuclear.”

**Joe Kappock** traveled to Quintana Roo, Mexico, to discuss enzymes, coenzymes, and metabolic pathways at a Zing Conference. Kappock attended The 3rd International Conference on Acetic Acid Bacteria University of Córdoba, Spain, and presented a talk entitled “Structures and functions of *Acetobacter acetii* CoA-transferases.”

**Xiaoqi Liu** had several international visiting scholars working in his laboratory this past year. Qiuyi Lu working in the bioscience master’s program at the King Abdullah University of Science and Technology in Saudi Arabia visited July–September 2011. In August 2011, Xianzeng Hou joined the Liu lab. Xianzeng is a student from Shandong University in China and he received a scholarship from the China Scholarship Council to pursue his studies in the United States as a joint PhD student for 18 months. His research involves Plk1 in Alzheimer’s disease and cancer.

**Andy Tao** traveled to China to be one of six instructors for the NSF-NSFC (National Science Foundation of America and China) Mass Spectrometry Workshop and Symposium in Beijing where he gave a talk entitled “The current challenges and opportunities of mass spectrometry-based proteomics: Case studies with phosphoproteomics.” While in China, he visited two other universities in Changsha and Suzhou to collaborate with colleagues. Tao also traveled to China to present a talk entitled, “Mass Spectrometry-based proteomics tools for molecular signaling” at the Beijing Conference and Exhibition for Instrumental Analysis (BCEIA). Afterward, he presented a talk, “Identification of direct kinase substrates using an integrated proteomics strategy” at the National Institute of Biological Sciences. From Beijing he traveled to Suzhou China to visit collaborators. In June 2012, Tao’s lab was joined by Zhenxia Du, a visiting scholar from Shijiazhuang, China, who received her PhD from Beijing University of Chemical Technology in 2006 in the area of polymer chemistry and physics. Her strength is in the development of methods for GC/MS and LC-MS/MS applied to food safety, environmental safety, medicines, and polymer materials. She has expertise in molecular characterization and structural elucidation using IR, NMR and mass spectrometry. While in the Tao lab she plans to do research on the development and application of affinity purification-mass spectrometry method.

## Botany and Plant Pathology

**M. Catherine Aime** was a guest of Roy Watling, Regius Keeper of the Royal Botanical Gardens, Edinburgh, Scotland, in January 2012. While there, she studied type specimens of various tropical fungi and did collaborative work on *Neopaxillus* and other Crepidotaceae. In February 2012, she was a guest of Robert Schlub, University of Guam, to investigate decline of *Casuarina* trees on Guam and Saipan and to train students. March 2013 took Aime to the National Taiwan University, Taipei, to teach a one-credit-hour course on Advanced Mycology. From May to June 2012, she was a participant in a field expedition to the Pakaraima Mountains of Guyana. This is the 13<sup>th</sup> year of an ongoing project to document fungal biodiversity in the Guiana Shield. Aime served on the International Commission on the Taxonomy of Fungi. She also served as the Associate Editor of the international journal *Mycologia* and a guest editor of *Biodiversity and Conservation*.

**Janna Beckerman** spoke on the Integrated Disease Management of Apples in May 2011 at China Agricultural University, Beijing, and Northwest Agricultural University, Xianyang, China. In July, while working collaboratively with USDA-FAS: Scientific Exchange for Ecuador with the University of Wisconsin and the University of Florida, she again spoke on the Integrated Disease Management of Apples at ESPOL-CIBE in Guayaquil, Ecuador. Beckerman was invited to speak on the IPM contribution to the current fungicide resistance crisis in apple management in September 2011, Rothamsted, England.

In August 2011, **Nick Carpita** was a symposium presenter at the 1<sup>st</sup> Brazilian Bioenergy Science and Technology Conference in Campos do Jordão, Brazil. His presentation was titled “Tailoring Biomass for Catalytic Conversion to Biofuels and Bio-based Products.” Carpita continues doing collaborative research with Marcos Buckeridge, University of São Paulo, Brazil; Goerge Haughn, University of British Columbia, Canada; Marcello Lenucci, University of Salento, Italy; Marcelo Loureiro, Federal University of Vicosa, Brazil; Robert Schaffert, EMBRAPA, Minas Gerais, Brazil; Peter Ulvskov, KVL, Denmark; and Tamra Western, McGill University, Canada.

**Zhixiang Chen** was invited to the College of Life Science, Hangzhou Normal University, China, in June 2011. His presentation was titled “Roles of WRKY transcription factors and autophagy in plant defense and stress responses.”

**Guri Johal** continued collaborative research with Jinquan Yu of Zhejiang University, China. During the fall of 2011, Johal was co-mentor for Sujay Rakshit, a Borlaug Fellow from India working on mapping of a dominant dwarfing mutant of maize. He also spent two weeks at the Punjab Agricultural University, Ludhiana, Punjab, India, as a visiting professor and delivered a number of presentations and lectures.

**Bill Johnson** hosted a group of farmers from Argentina in the summer of 2012 at Throckmorton Purdue Agricultural Center. Johnson is currently hosting an exchange student from Brazil.

**Ray Martyn** visited Northwest Agricultural & Forestry University (NWAUFU), Yangling, Shaanxi, China, during May 2012. Martyn taught a graduate course “Principles of plant disease management” to more than 50 MS and PhD students. He also presented a research seminar “Understanding the relationship between cultural practices and late-season vine declines of melons” during a Special Topics in Plant Pathology Symposium organized by Jun Quo of NWAUFU. Martyn also visited the NWAUFU Yanliang Melon Experiment Station outside of Xi’an, where he learned about their melon-breeding program focused on disease resistance. He is currently doing collaborative research with R. Cohen, Israel and D. Valkaounakis, Greece.

**Bob Pruitt** has received a new appointment as a scientific expert to evaluate application to the Plant Fellows program funded by the 7<sup>th</sup> Framework Programme of the European Union.

In summer 2011, **Mary Alice Webb** was an invited speaker at the 11<sup>th</sup> International Symposium of Biomineralization in Noosa, Australia. Her presentation was titled “Evolution of Calcium Oxalate Raphides in Angiosperms.”

In May of 2011, **Kiersten Wise** spoke on the integrated management of wheat diseases at the China Agricultural University Plant Protection Symposium, Beijing, China, and at the Northwest Agriculture and Forestry University Plant Protection Symposium Xiangye, China.

### Entomology

**Christian Oseto** served as an instructor for a Maymester Study Abroad in Costa Rica during May and June of 2012. In tandem with faculty from Botany and Plant Pathology and from Forestry and Natural Resources, he taught about the impact of biodiversity from conventional, sustainable, and cultural perspectives.

**Jeff Holland** visited Chien-chung Chen and Ling-lan Cheng in Taiwan in May of 2012 to discuss two collaboration projects: the influence of biodiversity on pest control in rice fields, and environmental factors influencing the occurrence of Mediterranean fruit fly in fruit orchards—with an emphasis upon the former project. The team visited rice fields at two long-term ecological research stations (TARI, DARES) and fruit fly monitoring stations, met with other researchers at the Department of Entomology at National Taiwan University, and planned data collection and analysis.

**Christian Krupke** was invited in April of 2012 to be a member of the International Union for the Conservation of Nature Taskforce on Systemic Pesticides, a group of scientists dedicated to identifying and clarifying links between pesticides and effects on non-target organisms. Their annual meeting will be in Padua, Italy, in November. Krupke has hosted a Fulbright scholar from Croatia since April, and students in his lab studied abroad in Colombia and Haiti. One of his lab students recently accepted a Borlaug fellowship for an internship at CIAT in Cali, Colombia.

**Rick Foster** continued as co-principal investigator with Stephen Weller (Horticulture) on the Integrated Pest Management CRSP which is discussed in the previous CRSP section. In February of 2012, Foster went to Kabul, Afghanistan, to visit with the Ministry of Agriculture, Irrigation and Livestock officials to plan future training programs in sanitary/phytosanitary systems. In April, he and two colleagues from Botany and Plant Pathology returned to Kabul to conduct a ten-day training for 12 Ministry members. The training included an overview of diagnostics and arthropod pest identification. Pre- and post-training tests were given, with the average score improving from 25.6 percent to 66 percent!

**Larry Murdock** continued his work on the Purdue Improved Cowpea Storage (PICS) project discussed in the previous Interdisciplinary International Efforts section. The PICS project is all over West Africa, in ten different countries (Nigeria, Niger, Burkina Faso, Ghana, Cameroon, Senegal, Togo, Benin, Chad, Mali). His most recent trip was to Ghana. See more about the PICS project at: <http://www.purdue.edu/differencemakers/murdock.html>.

In May of 2012, **Steve Yaninek** traveled to Kenya and Zambia as project collaborator for USAID Horticulture CRSP Indigenous African Leafy Vegetables for Enhancing Livelihood Security of Smallholder Farmers in Kenya, Tanzania, and Zambia. Development of a program to address the plant protection constraints as a component of a larger project is being done by documenting major pest constraints, determining appropriate pest management interventions, and teaching farmers and extension agents best pest management practices. The Horticulture CRSP is discussed further in the previous Collaborative Research Support Program (CRSPs) section.

Yaninek’s investigative visit continued in Kenya for Integrated Management of Pest Attacking African Indigenous Vegetables in Western Kenya. As principle investigator (PI) he monitored insect pest constraints on three crops: spider plant, nightshade, and amaranths in Lugari and Bungomba in western Kenya. Field trials evaluated pest responses to selected seed sources. Preliminary results show significant build-up of flea beetles on spider plants, but low levels of other pests when rainfall is plentiful. Aphids, leafminers, and spider mites were more common in drier conditions, and as crops matured and seeds developed. Trials will be repeated with a component focused on production under irrigation during the dry season.

**Cliff Sadof** co-directed the research of two graduate students at CATIE (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 per year to the Costa Rican economy.

**Christie Williams** was a speaker at the Canadian Plant Genomic Workshop in Niagara Falls, Canada, in August 2011. She was asked to give an oral presentation entitled “Hessian-fly induced changes in wheat epidermal permeability facilitate two-way exchange of molecules essential to resistance and susceptibility.”

### Food Science

**Arun Bhunia** was invited to deliver talks on biosensor-based technologies on foodborne pathogen detection and study of bacterial pathogenesis at three international conferences held in Shanghai, China; Prague, Czech Republic; and Foz do Iguacu, Brazil. He also visited and presented seminars at Jiangnan University, Wuxi, China; Technical University of Denmark (DTU), Copenhagen, Denmark; and at University of Pelotas (UFPe), Pelotas, Brazil.

In June 2011, **Christian Butzke** traveled to the vineyards of Alsace in France for a Chapitre Exceptionnel of the international wine brotherhood Confrérie des Compagnons Goustevin de Normandie in which he holds the title of baron. He also attended a session of the European parliament in Strasbourg and met with members of parliament from France, Germany, and Scotland to discuss agriculture policy. “Baron Butzke” was also inducted into the Confrérie Saint Etienne d’Alsace, a society of winegrowers and connoisseurs dating back to the sixteenth century, at the Château de Kientzheim.



Christian Butzke, European MEP Christa Klass, and retired NATO general Wilfried Wesch.

**Mario Ferruzzi**, **Christian Butzke**, and Bruce Bordelon (Horticulture and Landscape Architecture), joined forces with Texas A&M University to take 37 students abroad on the 2012 Maymester course titled FS 49100, Experiencing the Food, Wine and Culture of Italy. During their travels through the world’s largest wine producing country, they toured vineyards and wineries notably in Emilia-Romagna (Lambrusco) and Tuscany (Chianti, Montepul-

ciano, Montalcino), representative of Italian diversity in artisan wine production and value-added agriculture. A key stop included a visit to one of Italy’s leading academic institution, the Catholic University of Piacenza, for an update on Italian food and viticultural research and commercial agricultural practices. The students visited several farming and food manufacturing operations to explore the production of gourmet food products that ranged from Parmesan cheese and cured meats, to natural food colorings and gently processed vegetables. Ample exposure to Italian art and culture was provided through excursions to historic sites in Florence, the Italian capital Rome, and Vatican City.



Ferruzzi visited Conserva Italia in Bologna, Italy, in May of 2012 to discuss an ongoing collaborative research project involving Food Science colleague Fernanda San Martin and Conserve France on novel food processing influences on nutritional value of fruits and vegetable. Also, Ferruzzi and his graduate student Brian Song presented their research on “Phytochemical composition of human milk” at the 5th International Conference on Polyphenol and Health (ICPH) in Sitges, Spain, in October 2011. Additionally, in October of 2011, Ferruzzi traveled to Bamako, Mali, and Dakar, Senegal, along with Bruce Hamaker and Betty Bugusu of the Purdue International Food Technology Center (IFTC) to initiate discussion of new research and training initiative with Institut de Technologie Alimentaire (ITA) Senegal.

**Kevin Keener** took a sabbatical leave from October 2011 through October 2012 in Dublin, Ireland, collaborating on joint research with Dublin Institute of Technology (DIT), Dublin City University (DCU), and Innovació i Recerca Industrial i Sostenible (IRIS) in Barcelona, Spain. This research entitled SAFE-BAG (<http://www.safebag-sp7.eu/>) is focused on commercializing a sealed package, atmospheric cold plasma process to treat fruits and vegetables. During his sabbatical leave, Keener gave invited technical presentations on sealed package, atmospheric cold plasma to university, government, and industry leaders in Ljubljana, Slovenia; Barcelona, Spain; and Dublin, Ireland.

**Kee-Hong Kim** was invited to present the “Regulation of the link between obesity and intestine dysfunction by curcumin” at The Third International Symposium on Curry and Spice, Seoul, Korea, and a talk on “A Perspective view of dietary control of adipose development of obesity” for the Department of Food Science and Biotechnology, Seoul National University, Seoul, Korea. Kim also established research collaboration with Korean Food Research Institute (KFRI) and is PI on a KFRI-funded project titled Identification of Anti-Obese Phytochemicals and Their Metabolites—May 2012–December 2015.

**Andrea Liceaga** has been assigned as the Professional Support Chair for Sensory Evaluation by the Food Safety International Network (FSIN) [www.safefoodnetwork.com](http://www.safefoodnetwork.com). FSIN provides technical solutions, training, consulting, auditing, and certification schemes to professionals worldwide in the areas of food safety and quality. FSIN assists more than 200 companies and organizations worldwide and provides training to more than 1,000 members (FSIN, 2011). Liceaga’s role involves imparting three-day workshops on Sensory Evaluation to the Latin American food and beverage industry.

**Amy Hui-Mei Lin** lectured and received the Young Investigator Award from the International Conference on Food Factors (ICoFF) 2011 in Taipei, Taiwan. Lin is involved in international research collaborations with D. Rose and M. Pinto in Canada, R. Quezada-Calvillo in Mexico, and H. Naim in Germany.

**Lisa Mauer**, Director of the Center for Food Safety Engineering (CFSE), served as a member of the organizing committee for the Sixth International Forum on Food Safety and the 2011 Annual Meeting of the MOST-USDA Joint Research Center for Food Safety, held in Shanghai, China, September 27–29, 2011. She, along with CFSE members Arun Bhunia and Mike Ladisch, were invited speakers at these events, as were USDA-ARS collaborators in the CFSE. Mauer and Bhunia were also invited speakers at a food safety meeting at Huazhong University, Wuhan, China, on September 22, 2011. In June 2012, Mauer was an invited speaker at the Seventh International Conference on Water in Food, held in Helsinki, Finland. She presented work on deliquescence of crystalline solids, glass transition of amorphous solids, and behavior in blends of both crystalline and amorphous solids. Mauer also had a research project sponsored by Nestle, Switzerland, which supported a postdoc researcher on water-solids interactions. She visited the funding group in Lausanne, Switzerland, in June 2012 to discuss the project findings.

**Mark Morgan** attended an annual subgroup meeting of the European Hygienic Engineering and Design Group (EHEDG) at ADRIA Normandie in France. Purdue is the only authorized testing institute of EHEDG in the United States and Mark is a member of both the Test Methods subgroup and the Training subgroup. In May 2011, the first EHEDG workshop on hygienic design of food processing equipment in the United States was held at Purdue. EHEDG is quickly expand-

ing to be a global organization for the promotion of hygienic design and food safety and plans are being discussed for a U.S. section of EHEDG.

**Phil Nelson** was the keynote speaker for the 16<sup>th</sup> IUFOST (International Union of Food Science and Technology) World Food Congress in Fox do Iguacu, Brazil. His talk, “Aseptic bulk processing and packaging technology and availability of nutritious foods worldwide,” was given to 2,500 attendees from 40 countries.

**Haley Oliver** traveled to Kabul, Afghanistan, in February 2012 for an initial assessment for the Afghanistan Sanitary/Phytosanitary Project awarded to Purdue University/Kevin McNamara by the USDA Foreign Agriculture Service in September 2011. Food Safety training for personnel in the Ministry of Agriculture, Livestock, and Irrigation is one of the major focuses of this capacity-building grant. Oliver and others concluded that training in fundamental food safety and sanitation were the immediate needs of the government officials and food industry leaders. Oliver and Kendra Nightingale of Texas Tech University delivered a food safety training workshop in June 2012 to government employees and food industry leaders that focused on basic sanitation, good agriculture practices, and good manufacturing practices. Follow-up trainings are scheduled for fall 2012.

2011–12 was the first year *ANSC 49500 Animals and Food Security Service Learning–Haiti* was offered jointly by Haley Oliver and Mark Russell (Animal Sciences). A total of 18 students were enrolled in the inaugural 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 of a service learning that introduced Purdue students to local students and residents in Cap-Haitien, Haiti. The second class of students is currently meeting and preparing to travel to Haiti over winter break.

**Fernanda San Martin** hosted USDA Borlaug Fellow Sri Yuliani for three months. Yuliani is a scientist at the Indonesian Center for Agricultural Postharvest Research and Development (ICAPRD). In February 2012, San Martin visited ICAPRD to initiate collaborative efforts. In addition, collaborations with Mexican Higher Education Institutions were initiated. During summer 2011, she hosted two graduate students, Julio and Adriana, from Instituto Tecnológico de Veracruz who conducted part of their research projects at her lab. Also, a professor from Universidad Autonoma del Estado de Hidalgo, Diana Pimentel, worked in San Martin’s lab for three months. All visiting scholars worked on projects related to emulsification by high-pressure homogenization. San Martin served as part of the examination committee for Claudia Coronel, a doctorate student from Universidad de las Americas Puebla.

**Yuan Yao** led a group of eight graduate students from the Departments of Food Science and Agriculture & Biological Engineering on a two-week study tour trip to China during the

summer of 2012. The group visited three academic institutions and many multinational food and ingredient companies doing business in China. The intent of this trip was to expose graduate students (who are likely headed to such companies for employment) to the business and technological operations of these companies, to help make the students more marketable and effective as employees. A generous gift from Kraft Foods helped make this study tour possible.

**International Extension:** During Spring Break 2012, the **Purdue Wine Grape Team** (Christian Butzke, Bruce Bordelon, Jill Blume, Jeanette Merritt) took 27 commercial winemakers and growers from Indiana, Illinois, Missouri, and Florida on an international Extension course to explore the wine industries of Chile and Argentina. The group visited wineries and vineyards in Chile's Maipo, Casablanca, and Aconcagua Valleys, and—travelling across the 22,841 ft high Andes—Argentina's wine country around Mendoza. They had an opportunity to compare conventional, organic, and biodynamic farming operations and tour family orchards with local avocado farmers.



**International Food Technology Center** (IFTC), one of the four centers housed in the Department of Food Science, continued its mission to expand markets and reduce losses for local food crops in developing countries ([www.purdue.edu/iftc](http://www.purdue.edu/iftc)). IFTC activities included technology development and innovation, technology adoption and entrepreneurship, and capacity building.

IFTC through the leadership of Bruce Hamaker continued to contribute to the ongoing projects in Mali and Senegal sponsored by the USAID-Mission in the respective countries to establish enterprises for sorghum and millet processing using the incubation model concept. IFTC sponsored its first Center intern (undergraduate student) to work on food processing technologies in Dakar, Senegal.

Suzanne Nielsen (Department Head) and Betty Bugusu (IFTC Director) conducted a one-credit course (FS 491) during the fall semester (2011) focused on mango fruit processing with specific application to the country of Haiti. Eight senior food science students enrolled.

IFTC received a grant in the amount of \$30,740 from Kilimo Trust, an independent organization working on agriculture for development across the East Africa Community Region, to provide technical expertise in the food processing and value addition for their strategic plan.

IFTC hosted a symposium titled “Linking Farmers to Markets in Developing Countries” on October 13 at the 2011 World Food Prize (WFP) meeting in Des Moines, Iowa. The speakers included: Philip Nelson, 2007 WFP Laureate; Jeff Dykstra, Executive Director, Partners in Food Solutions (General Mills, Cargill and DSM non-profit); and Ababacar N'doye, Director General, Institute for Food Technology Dakar, Senegal.

Bugusu gave a talk titled “Technologies to reduce losses of agricultural crops” at the first Symposium on Food Security and Poverty Reduction to be held at the Universidade Federal de Viçosa, Brazil, on November 16–18, 2011 and another talk titled “Assessment study for commodity markets in East Africa” at Purdue's Global Policy Research Institute (GPRI) Grant Challenge Conference on April 18, 2012.

IFTC established formal partnerships with private and public organizations, domestically and internationally to develop programs and solutions to address food security issues (including University of Pretoria in South Africa; Kilimo Trust, an independent organization based in Kampala, Uganda, working on agriculture development in the East Africa Community; Institute de Technologie Alimentaire, ITA, in Dakar, Senegal). IFTC also strengthened existing partnerships (e.g., National de Recherche Agronomique du Niger, INRAN, in Niamey, Niger, and Institut d'Economie Rurale du Mali, IER, in Bamako, Mali).

### Forestry and Natural Resources

**John (Barny) Dunning** taught the International Natural Resource Issues course, FNR 460. He took 14 Purdue students (out of 30 total students) for a four-week trip to Sweden, Finland, and Estonia. It was the first time in Estonia and essentially the first time students in the course visited Finland. The topic was sustainable agriculture, which included organic and conventional farming (European conventional farming is very different from ours in the United States), forestry, wetland protection, and wildlife issues.

**Tomas Hook** and faculty/students from SLU (Swedish University of Agricultural Sciences) and North Carolina State University also participated in the course.

**Paul Brown** was named one of the new Associate Editors for the *Journal of Ocean University of China* and has a new graduate student from Bangladesh (N. Siddiqui, M.S., whose tentative research project title is “Thermal and UV effects on antioxidant vitamins and nuclear signaling in the aquatic food chain”).

**Jeff Dukes** was a co-convenor for session BG1.6: Climate extremes, ecosystems, and biogeochemical cycles, at the European Geosciences Union General Assembly in Vienna.

**Reuben Goforth** led a group of 13 students, including an undergraduate teaching assistant, to Costa Rica for the Tropical Biology Practicum Study Abroad. They spent ten days in Costa Rica at La Tirimbina Bioreserve, Bijagual Ecological Reserve, and the Organization for Tropical Studies' La Selva Biological Research Station. Students conducted studies on rainforest biology, stream ecology, and ecology of amphibians and reptiles. They also participated in a trip to Cahuita National Forest on the coast. Data collected as part of the stream ecology sampling has been incorporated into a database for evaluating the effects of land use on tropical stream fish communities.

**Eva Haviarova** visited several institutions in Europe with significant furniture design programs and developed further cooperation during the second part of sabbatical leave in spring 2012. She toured facilities, met with administrators, faculty, and students and delivered presentations and lectures at the following educational institutions: Mugla University, Mugla, Turkey; Gazi University, Ankara, Turkey; EGE University, Ismir, Turkey; Poznan University, Poland; Mendel University, Brno, Czech Republic; and Technical University, Zvolen, Slovakia. She communicated with four potential graduate students who received funding from the Turkish government and are in the process of completing their English proficiency exams. Two students plan to start their graduate programs at Purdue under her supervision in fall 2012. Haviarova also contacted forestry industry entities in Turkey. She met with Secretary General of the Association of Turkish Furniture Manufacturers and learned about the state and goals of the Turkish furniture industry. She also visited four companies in one forest products industry cluster (Damircan, Doria, Ates Selik, Gunes Fayton) and became more familiar with the fast growing furniture manufacturing industry in Turkey. She was able to visit their production facilities, talk to production managers, and obtain a better perspective of the Turkish furniture industry and its goals to be a significant player in the global market.

**Bill Hoover** coordinated forestry and watershed training for the Agriculture Development Teams deploying to Afghanistan and also worked with three Afghan foresters at Purdue who were preparing for graduate school.

**Douglass Jacobs** hosted six visiting international scientists in his laboratory: Bira and Marlene Malavasi (professors, Western Parana University, Brazil), Magnus Löf (professor, Swedish University of Agriculture Science), Pedro Villar-Salvador (professor, University of Alcalá, Spain), Mercedes Uscola (PhD student, University of Alcalá, Spain), and Barbara Mariotti (research scientist, University of Florence, Italy) during the 2011–12 academic year. Along with a group of five Spanish scientists, he also served as co-PI on a

project (2011–13) funded by the Spanish Ministry of Science and Innovation entitled “Tolerance and ecophysiological strategies of Iberian pines at juvenile stages to drought, low temperature, and nutrient availability.” Jacobs gave invited research presentations in Spain, Canada, France, and Sweden. He also co-organized an International Union of Forest Research Organizations (IUFRO) symposium entitled Restoring Forests: Advances in Techniques and Theory held in Madrid, Spain, during September 2011. A total of 105 participants attended. The symposium was designed to highlight recent scientific advancement in forest restoration with focus on dynamic principles, management practices, and policy. A special issue of the international journal *New Forests* will be published in September 2012 with 27 selected papers from the symposium.

**Rick Meilan** helped organize the China-U.S. 2011 Joint Symposium on Global Sustainability Issues in Energy, Climate, Water and Environment, which was held on the Purdue campus September 26–29, 2011. In May 2011, he began hosting Pamela Quiroga Echeverría, a PhD student from the Department of Forest Science at the University of Concepción in Chile. Pamela is completing a portion of her PhD research in Meilan's lab. The title of her project is Silencing of *HCT* in *Populus* and assessing its effect on saccharification efficiency.

**Bryan Pijanowski** was invited to give a talk at the European Union COST Programme's Workshop on Protecting and Preserving Soundscapes at UNESCO World Heritage Sites. The workshop was held in Capri, Italy, in October 2011. Portions of his talk were aired on a local news station in Naples, Italy. Pijanowski's research has been featured on several international media products. He gave a live interview to Australian National Public Radio in March of 2012. The national live call-in show focused on how we can “quiet down” our cities and improve the acoustic properties of public spaces. He was interviewed by Public Radio International (PRI) for their Living on Earth program, by the UK-based *Ecology News* on his soundscape ecology research, and by *Science News* for the iPad. Pijanowski participated in a September 2011 Romanian National Research Council (NRC) panel on environmental engineering research programs in Romania. The National Science Foundation's Coupled Natural Human Systems program funded the Pijanowski lab for a Global Sustainable Soundscape Research Coordination Network (RCN) project. The aim of this five-year global research coordination network is to develop protocols for comparing soundscapes in diverse ecosystems around the world and to develop public awareness programs that help to promote the sustainability of natural soundscapes. Pijanowski traveled with Melba Crawford (Agronomy) and Luis Villanueva-Rivera (PhD student, FNR) to La Selva, Costa Rica, to perform *in situ* verification of the LIDAR data that was processed for the research station. They also gave a three-hour workshop on soundscapes to the graduate students in the Wildlife Conservation Program at the Universidad Nacional in San Jose, Costa Rica.

**Paula Pijut** continued as associate editor of *Plant Cell, Tissue and Organ Culture*, *Journal of Plant Biotechnology*, Springer, The Netherlands; member of the Editorial Board, Propagation of Ornamental Plants, Salvia Press, Sofia, Bulgaria; and as Research Advisor, Trees for Tanzania ([www.treesfortanzania.com](http://www.treesfortanzania.com)) and Member of the Advisory Board. Pijut is a Member of Biotechnology Faculty, Columbia-Purdue Institute for Advanced Scientific Research (<https://engineering.purdue.edu/CPIASR>) and was invited by Franklin Gregory, University of Minho, Portugal, to collaborate on a project titled, New Tools for Functional Genomics of Cork Oak (*Quercus suber* L.).

**Marisol Sepúlveda** was invited to present her research and chair a session at the First International Conference on Environmental OMICS, held in November 9–12 in Guangzhou, China. She also served as the major advisor for several international students: Shuai Chen (China), Jenny Zenobio (Peru), Ahmed Abdel-Moneim Mohamed (Egypt). Between October 2011 and February 2012, her laboratory hosted PhD student Azadeh Hatfeh, an Iranian National and PhD student from University of South Bohemia, Czech Republic. While at Purdue, Azadeh conducted research on sex differentiation in Japanese medaka.

**Guofan Shao** gave an invited presentation titled “Sustainable Forest Management in the United States” at the Annual Conference of China’s Forest Industries in Jilin Province, China, Aug. 25–29, 2011. He participated in the China-U.S. 2011 Joint Symposium on Global Sustainability Issues in Energy, Climate, Water and Environment, which was held on the Purdue campus September 2011. He gave a presentation titled “Realities & Potentials of Wood Energy: A Geospatial Perspective.” He helped publish selected presentations in the *International Journal of Sustainable Development and World Ecology*, for which he was associate editor.

**Keith Woeste** has a longstanding collaboration with forest genetics researchers at Northwest A&F University in Shaanxi, China, which resulted in two refereed publications this past year. His collaboration with researchers in Japan who study of the reproductive ecology of *Juglans* resulted in the publication of a manuscript in the journal *Plant Ecology*. Finally, his seven-year collaboration with Dr. Malvolti at CNR-IBAF in Porano, Italy, resulted in several presentations and two refereed publications in the past year.

**Hao Zhang** visited three universities in China during the summer of 2012: University of International Business and Economics in Beijing, Shanghai University of Finance and Economics, and Zhejiang University. He also obtained a grant from the Social Science Foundation of China for the study of extreme weather events. He attended several high profile forums in China on extreme weather and national strategies. Zhang’s research talks included: (1) Statistical Challenges in Monitoring and Modeling Agricultural Diffuse Pollutions, ISI 58th Congress, Dublin, Ireland, August 2011 (Invited); (2) Massive Spatio-temporal Data in Environmental

Studies, 2012 International Symposium of Statistics and Management Science, Huangshan, China, July 2012. (Planetary); (3) Statistics for Extreme Events, University of International Business and Economics, Beijing, China, July 2012; (4) A Study on Spatial Correlation for Crop Insurance, Zhejiang University, Hangzhou, China, July 2012.

### Horticulture and Landscape Architecture

**David Barbarash** presented a paper titled “The Communication Value of Graphic Visualizations Prepared with Differing Levels of Detail” at the Digital Landscape Architecture 2012 Conference in Anhalt, Germany, in June 2011.

**Bruce Bordelon** and Christian Butzke (Food Science) led an Extension Study Tour for 20 commercial winemakers from Indiana, Michigan, Missouri, and Florida to the major wine regions of Chile and Argentina in March 2012.

**Natalia Dudareva** was a co-chair of the Third Banff Conference on Plant Metabolism, which was held in Banff, Canada, June 28–July 2, 2012. She gave several talks: at the SOL & ICUGl 2011 (8<sup>th</sup> Solanaceae and Second Cucurbitaceae Joint Conference), November 28–December 2, 2011, Kobe City, Japan; at 12<sup>th</sup> World Petunia Days meeting, March 17–21, 2012, Erfurt, Germany; at the Fifth International Symposium Breeding Research on Medicinal and Aromatic Plants, June 18–20, 2012, Vienna, Austria; at the Third Banff Conference on Plant Metabolism, Banff, Canada, June 28–July 2, 2012; at the Max-Planck Institute for Chemical Ecology, Jena, Germany (March 2012) and at the University of Dusseldorf, Dusseldorf, Germany (March 2012). She also served as a member of Scientific Advisory Board for a Center of Excellence on Plant Sciences (CEPLAS) at the University of Dusseldorf, Dusseldorf, Germany. Bao Yang, an Associate Professor from South China Botanical Garden (formerly South China Institute of Botany), Chinese Academy of Sciences, Guangzhou, China, has received a fellowship from the Chinese Academy of Sciences to work as a visiting scientist in Dudareva’s laboratory from April 6, 2012, through April 5, 2013.

**Avtar Handa** visited his collaborator at the Institute of Virology and Biotechnology, Zhejiang Academy of Agricultural Sciences, Hangzhou, and also presented a seminar on improving fruit quality attributes. Handa was invited by Professor Yunbo Luo, Dean of College of Food Science and Nutritional Engineering, China Agricultural University, Beijing, to present a research seminar and to meet with the faculty of College of Food Science and Nutritional Engineering. In February 2012, Handa delivered an invited lecture at the International Conference on Plant Biotechnology for Food Security: New Frontiers held at National Agriculture Research Center, New Delhi, India. He also presented an invited seminar at the School of Biotechnology, Madurai Kamaraj University, Madurai, India, during his India visit. Handa was invited to deliver a talk at the 7th International Postharvest Symposium, July 2012, in Kuala Lumpur, Malaysia, on antioxidants, bioreactive compounds, and health-promoting substances. He is co-major professor for a PhD

student from the University of Abomey-Calavi, Benin, Africa, and a PhD student from Assiut University, Assiut, Egypt. Additionally, two scholars from The Punjab University, Lahore, and one from National Center on Plant Biotechnology, New Delhi, continue training in advanced molecular biology techniques in Handa's laboratory until November 2012.

**Peter Hirst** was again invited to visit the Northwest Agriculture and Forestry University (NWFU) in China during summer 2012. His host was Mingyu Han, Chief Scientist for apple for China. The visit focused on developing research collaborations in the area of apple research specifically tree canopy architecture, rootstock development, flowering, and fruit development. Hirst informally advised graduate students and efforts are currently underway to formalize this relationship. Hirst hosted two visiting scientists from NWFU and plans are underway for graduate student visits next year to conduct research within Hirst's program.

**Jules Janick** cooperated with two French Nurseries, DLO, Angers, and Pepinieres Escande, which have licensed Purdue apple varieties and are reviewing new selections. He traveled to Vicosa, Brazil, in December 2011 as a representative of Purdue for the Celebration of the 50<sup>th</sup> anniversary of the Postgraduation Program of the Federal University of Vicosa. He also lectured at the department of Phytotecnia. In April 2012, he presented at the Fifth International Conference on Mediterranean Studies in Athens, Greece. His presentation was entitled "Ancient Greek Illustrated Dioscoridean Herbs: Origins and Impact of the *Juliana Anicia Codex* and the *Codex Neopolitanus*."

**Roberto Lopez** traveled to Central America with his PhD student to visit stock plant facilities where unrooted cuttings are harvested for shipment around the world. They were joined by faculty members from North Carolina State University and University of New Hampshire, making this a multi-university Extension trip. They collected data to quantify environmental conditions and cultural practices at each stock plant facility. Identifying the variations and similarities among the facilities enhanced our understanding of the impact of culture and environment on cutting production, which is a major focus of our research. This trip was partially supported by the American Floral Endowment.

Lopez and his colleagues conducted research this past summer in conjunction with the Center for Native Floriculture at the University of Queensland and the Queensland State Government. They studied the effects of temperature on the germination of four native Australian forbs with commercial floriculture potential. This work aimed to improve the propagation of native Australian species adapted to xeric conditions for use as alternative ornamental germplasm and was supported by a Purdue-University of Queensland Early Career Researcher Travel Grant and the American Floral Endowment.

**Mike Mickelbart** served as mentor to Vandna Rai, an India Borlaug Fellow, for an eight-week program from August–October 2011, looking at soil salinity and drought research. In February 2012, Mickelbart completed his reciprocal mentor visit to the National Research Center on Plant Biotechnology in New Delhi, India, to continue collaborations with Rai. During his visit, he met with scientists and students at the center and presented a seminar entitled "The genetic basis of water use efficiency in maize."

**Paula M. Pijut** has a joint appointment with Forestry and Natural Resources. See that section for a description of activities.

**Burkhard Schulz** participated in the 2011 Brazil-U.S. Frontiers in Bioenergy Symposium with a contribution on genetic basis of plant cell elongation. He presented two papers on brassinosteroid regulation of sex determination in maize and leaf angle regulation in maize at the First International Brassinosteroid Conference in Barcelona, Spain, June 27–29, 2012. He was also invited to present a lecture about brassinosteroid function in plant development at the University of Milan, Italy, in June 2012.

**Stephen Weller** continued his international research and capacity building work through the AMPATH program and Integrated Pest Management and Horticultural Collaborative Research Support Programs (CRSPs). These international activities are described in the previous International Interdisciplinary Efforts and CRSP sections of this publication.

### Youth Development and Agricultural Education

**Colleen Brady**, along with Jordan Kerr (Purdue Calumet), led a group of 23 students on a Maymester study-abroad course to Ireland and the United Kingdom (UK). Students learned about the horse industry, history, and culture in Ireland and the UK, as well as exploring opportunities for further study abroad with partner institutions in Wales and Ireland.

Brady and **Mark Tucker** served as major professors for two Malawian graduate students, funded by a \$120,000 Michigan State/USAID Initiative for Long-Term Training and Capacity Building (UILTCB) grant. The two students spent the 2010–11 academic year on campus completing coursework for a master of science degree in Youth Development and Agricultural Education. The 2011–12 academic year saw the students back in Malawi completing the research portion of their degree. Brady and Tucker will be traveling to Malawi in October 2012 to help the students finalize their thesis research in Extension education and agricultural communication.

**Jerry Peters** 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. He also presented a workshop on adult/extension education to the Indiana National Guard Afghan Agriculture Development Team that will be deployed to Afghanistan late 2012. Peters traveled to Windhoek, Namibia, to present a poster at the 27<sup>th</sup> Association for International Agricultural and Extension Education Conference on his work in developing curriculum for the agricultural vocational high schools of Afghanistan. He traveled to Bangkok, Thailand, and presented a poster at the 28<sup>th</sup> Annual Association for International Agricultural and Extension Education Conference on his development of a workshop for the high school agriculture teachers of Afghanistan. In a USDA-funded project he assisted with a workshop to Strengthen Extension Skills of Young Professional in Afghanistan and Pakistan at the University of Agriculture Faisalabad, Pakistan.

**Mark Tucker** and **Roger Tormoehlen** welcomed a visiting scholar, Rong Sheng, from the China Agricultural University in Beijing, China. Professor Sheng is interested in rural social issues, especially those that apply to youth-based issues and the displacement of agricultural workers. Professor Sheng joined YDAE in March of 2012 for a year-long appointment.

Tormoehlen and several youth educators in Extension Areas II and IX organized, in partnership with our 4-H and governmental colleagues in Poland, a two-week cultural exchange of 15 Indiana youth to Poland. The six Area II youth and four adult chaperones were hosted by the Polish Extension system and Polish 4-H families in the Opolskie voivodship (province). The nine youth and 11 adults from northern Indiana were hosted by Polish 4-H families and governmental officials from Swietokrzyskie voivodship.

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## PURDUE AGRICULTURE



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